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COVER: Fish net on BCF's research vessel "Albatross IV" is set out during snowstorm on fishing banks south of Nova Scotia. (Photo: Robert K. Brigham.)

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

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Gloucester, Mass.

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Stacking purse seine net on the tuna clipper "West Point" (BCF Tuna Resources Laboratory, La Jolla, California).

UNITED STATES

VALUE OF 1966 CATCH IS NEAR 1965 RECORD

The value of United States fishery products to commercial fishermen in 1966 is forecast at $445 million, only about $1 million short of the 1965 record.

The volume of the catch is expected to be 4.3 billion pounds, the lowest since 1947.

The total value remains high despite the smaller catch because the harvest of high-value fishery products, those people eat, is at about the same level of recent years--2.5 billion pounds--and price levels approximate last year's. The sale of edible fishery products makes up, by far, the largest part of fishermen's income.

Shrimp and Pacific salmon are again ranking one-two among dollar earners. Shrimp are bringing fishermen the highest average prices per pound in the history of the fishery.

The drop in the total fish catch reflects the decline in the industrial fish catch--primarily the dramatic decrease in the menhaden catch. The menhaden catch plummeted from 1.7 billion pounds in 1965 (36 percent of the total catch of all species) to 1.133 billion pounds in 1966. While the total value of menhaden was down, average prices were up because prices in the fish meal industry, a prime user of menhaden, were the highest in its history. (BCF/Branch of Fishery Statistics.)

Coming issues of COMMERCIAL FISHERIES Review will report the 1966 catch in greater detail.

SITUATION AND OUTLOOK

Supplies of edible fishery products at the beginning of November 1966 were the heaviest ever for that date. Compared with a year earlier, stocks of frozen products were up substantially. There were marked increases in holdings of fillets and steaks of cod, flounder, and ocean perch. Stocks of fish sticks and portions, halibut, salmon, and spiny lobster tails also were higher. Storage holdings of frozen shrimp, scallops, and crabs (including crab meat) were down. Among cured products, holdings of salted herring were plentiful compared with 1965.

The fine run of pink salmon in Alaska in 1966 and a good run of reds assure plentiful stocks of canned salmon for coming months. Supplies of canned tuna appear adequate; the pack to date is running well ahead of last year.

Imports of edible fishery products likely will exceed those of 1965. However, the 1966 beginning inventory was lighter than 1965, so total supplies in 1966 may fall somewhat short of the amount available in 1965.

Overall, retail prices for fishery products advanced throughout 1965 and the first three quarters of 1966. Further gains seemed likely as the last quarter began.

Present indications are that per-capita consumption of edible fishery products for 1966 will be 10.8 pounds; last year it was 11 pounds. Very little change is in prospect for fresh and frozen or cured fishery products, but consumption of canned fishery products will fall off a little.

The Year Ahead

The outlook for 1967 is for a continued high rate of per-capita consumption at only slightly higher prices. Total domestic production may not increase over 1966's but increasing imports will supplement domestic production.

Increasing worldwide consumption of the sea's resources is expected. The world catch of fish and shellfish has more than doubled during the past decade--from about 60 billion pounds to more than 120 billion. The United States catch has not increased, but imports have risen. Some experts predict a several-fold increase in the world catch and even estimate that man is now taking only about 4 percent of the harvestable living resources. (BCF/Branch of Current Economic Analysis.)

President Johnson Signs Fish Protein Concentrate Bill

President Lyndon B. Johnson signed the Fish Protein Concentrate Bill in Anchorage, Alaska, on November 2, shortly after returning from the Far East. As enacted, the bill (S. 2720) is Public Law 89-701.

The purpose of the act is to set up a pilot program that will produce low-cost protein concentrate from fish. The act authorizes the appropriation of $1 million to build a Government-owned plant, and $1,555,000 annually for 5 years, beginning in fiscal 1968, to lease a second plant and to operate both plants.

The President said: "I am today signing a bill which marks another advance in this Nation's commitment to eliminate poverty, famine, and disease throughout the world. This measure will make it possible to apply the results of research from the laboratory to the economic large-scale production of a wholesome, nutritious protein concentrate.

"Protein deficiency is a problem even in our own country here in America. But even more important, it is the greatest cause of childhood disease and illness throughout the world--and particularly in the less developed countries.

"The fish protein concentrate to be developed in this program will be used to fortify foods of many kinds without changing their taste or their texture. It is easy to transport, because 85 percent of the world's population, almost 3 billion people, live less than 500 miles from the sea. It can be made available without the need for special storage or refrigeration and its use throughout the world will not require any change in food custom or habits.

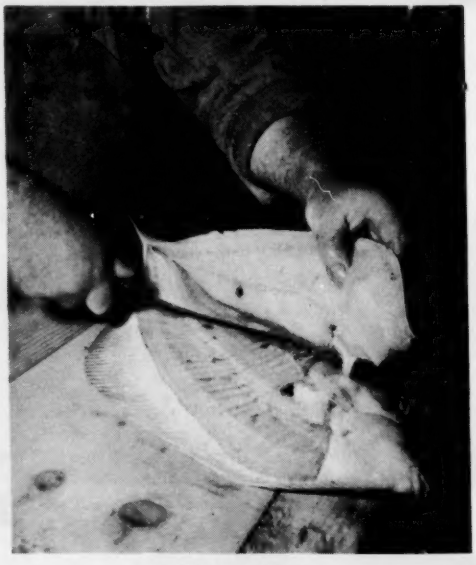
"The boundless fishery resources of the seas are as extensive as the seas themselves. Marine biologists tell us that the oceans could support an annual catch of 400 to 500 billion pounds of fish and that is a very important source of animal protein.

"Nevertheless, despite the world's increased fishery efforts, 85 percent of this great potential supply goes unused every year. This fish protein concentrate program offers us an opportunity to utilize our fishery resources, to provide the world with a protein source of great value at a very low cost, to help our commercial fishing industry to prosper. This is a challenge and it is an important beginning."

October Wholesale Prices and Indexes for Edibles

Wholesale prices for edible fishery products (fresh, frozen, and canned) decreased slightly from September to October 1966. The October index was 131.3 percent of the 1957-59 average; it dropped 0.1 percent from September but was 11.3 percent higher than October 1965. Prices were generally lower than in September, but there were substantial increases for several selected items.

The subgroup index for drawn, dressed, or whole finfish rose 0.4 percent from September to October--mainly because of sharply higher prices at Boston for ex-vessel large haddock (up 43.2 percent); landings were light, demand good, and market strong. Prices were lower at New York City for western fresh and frozen king salmon (down 7.2 percent) and down slightly for western halibut (market supplies were the frozen



Cutting first fillet.

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1966 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Oct. 1966	Sept. 1966	Oct. 1966	Sept. 1966	Aug. 1966	Oct. 1965
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					131.3	131.4	129.5	118.0
Fresh & Frozen Fishery Products:					136.1	137.0	133.5	121.7
Drawn, Dressed, or Whole Finfish:					136.2	135.6	131.8	131.9
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.21	.15	164.0	114.5	109.9	181.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.47	.48	139.0	142.0	142.0	142.0
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.93	1.00	129.6	139.7	136.2	117.0
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.62	.83	91.8	123.1	109.7	78.3
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.67	.88	108.9	143.2	145.7	99.9
Processed, Fresh (Fish & Shellfish):					138.1	137.6	130.9	119.1
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.54	.45	131.2	109.3	111.8	119.0
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.12	1.11	131.2	130.1	130.1	101.4
Oysters, shucked, standards	Norfolk	gal.	8.75	9.00	147.5	151.8	134.9	141.2
Processed, Frozen (Fish & Shellfish):					128.6	132.0	131.5	107.6
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.43	.42	109.0	106.4	109.0	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.40	.41	115.8	118.7	115.8	117.3
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.32	.32	110.5	112.2	114.0	107.0
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.16	1.20	137.5	142.3	142.3	102.6
Canned Fishery Products:					123.3	122.0	122.9	113.0
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.00	28.00	122.0	122.0	124.2	117.7
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	12.95	12.95	115.0	115.0	115.0	102.6
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	8.00	8.00	135.6	135.6	135.6	120.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	11.25	10.25	144.3	131.5	131.5	121.9

1/ Represent average prices for one day (Monday or Tuesday) during week in which 15th of month occurs. Prices are published as indicators of movement, not necessarily absolute level. See daily Market News Service "Fishery Products Reports" for actual prices.

Source: U. S. Department of Labor, Bureau of Labor Statistics.

product). October prices for Great Lakes fresh fish were down considerably from September's high Jewish Holiday levels. Compared with October 1965, the subgroup index this October was up 3.3 percent; prices were up for salmon and fresh-water fish species.

Haddock Prices Higher

Substantially higher prices for fresh haddock fillets (up 20 percent) were largely responsible for 0.4-percent rise in subgroup index for fresh, processed, fish and shellfish. Prices at New York City for South Atlantic fresh shrimp rose 0.8 percent from September, but prices dropped for standard shucked oysters (down 2.8 percent). The index was 16 percent above October 1965; prices for all subgroup items were higher.

Prices declined from September in subgroup for processed, frozen, fish and shellfish; index dropped 2.6 percent from September. The exception was flounder fillets (up 2.4 percent). Chicago prices for frozen shrimp were down 4 cents a pound from September but were still sharply higher than a year earlier. The October 1966 index was 19.5 percent higher than October 1965, because of higher prices for all items except haddock fillets.

Higher prices from September to October for canned Maine sardines (up 9.7 percent) were responsible for a 1.1 percent rise in index for canned fishery products. October prices for other canned fish were the same as September's. The 1966 pack of Maine sardines through October was 1.1 million standard cases--about 9 percent below the 1965 period. October 1966 prices were higher than October 1965 prices for all canned fish products; the subgroup index was up 9.1 percent. (BCF Market News Service.)

Industrial Fishery Products

FISH MEAL SUPPLY IS UP 7.6%, SOLUBLES DOWN 13%

Based on domestic production and imports, the supply of fish meal available in the U. S. for the first 9 months of 1966 was 502,329 short tons--35,626 tons (7.6 percent) more than 1965 period. Domestic production was 51,742 tons (24.9 percent) lower, but imports were 96,775 tons (38.8 percent) higher than in January-September 1965. Peru continued to lead with shipments of 216,476 tons.

The U. S. supply of fish solubles during January-September 1966 was 73,671 tons--down 13 percent from same period in 1965. Domestic production of fish solubles decreased 13.7 percent, but imports increased 0.8 percent.

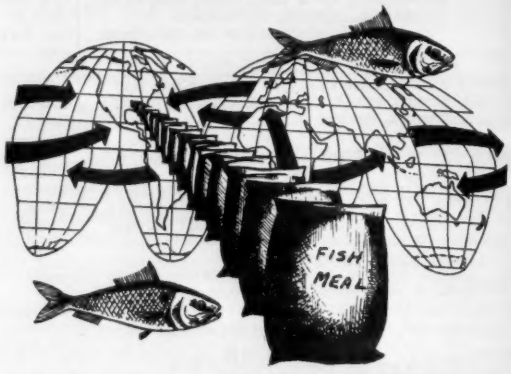
Supply of Fish Meal and Solubles, January-September 1966

Item	Jan.-Sept. 1966	Jan.-Sept. 1965	Total 1965
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Groundfish	7,971	9,347	10,696
Herring	9,794	11,622	12,932
Menhaden 1/	107,706	154,367	175,959
Tuna and mackerel	22,876	18,709	25,399
Unclassified	8,047	14,091	17,360
Total production 2/	156,394	208,136	242,346
Imports:			
Canada	35,310	32,623	43,830
Peru	216,476	204,345	209,801
Chile	65,179	5,132	5,651
Norway	15,096	49	78
So. Africa Rep.	6,040	2,900	5,100
Other countries	7,834	4,111	6,206
Total imports	345,935	249,160	270,666
Available fish meal supply	502,329	466,703	524,717
Fish Solubles 3/:			
Domestic production	69,883	80,958	94,839
Imports:			
Canada	1,184	1,253	1,488
Mexico	303	175	227
Peru	1,941	1,504	2,598
Other countries	360	825	825
Total imports	3,788	3,757	5,138
Available fish solubles supply	73,671	84,715	99,977

1/Includes other species.
2/Does not include a small quantity of shellfish and marine animal meal and scrap because production data are not available monthly.
3/Wet-weight basis except for imports from South Africa Republic (included in "other countries").
Source: BCF, and U. S. Department of Commerce, Bureau of the Census.

U. S. and World Fish Meal Situation and Outlook

World production of fish meal during the first 9 months of 1966 was up significantly from a year earlier, several trade sources indicated. Shipments from exporting countries were down about a tenth. Inventories in several important exporting countries were above the same 1965 period.



U. S. supplies of fish meal during January-September 1966, excluding production from shellfish and marine mammals, were 502,329 tons. This was second only to the 1964 record of 554,000 tons available to the domestic market. Domestic production totaled 156,000 tons, down a fourth from 1965. But it was more than offset by imports of 346,000 tons--almost 40 percent above the same 1965 period.

The most significant development in the domestic industry was the drastic reduction in the menhaden resource. It was substantially below the low levels of several years. Landings have trended downward since the record 1961 catch.

Output of menhaden meal was 30 percent below the 1965 period and 38 percent below average. Gulf Coast output was down almost a fourth; the Atlantic Coast output was 44 percent below January-September 1965.

1966 Domestic Demand was Strong

Domestic demand for fish meal in poultry rations continued strong in 1966. Broiler production was up 9 percent, and broiler prices averaged about 6 percent above 1965. Peruvian prices were well above those of a

year earlier during early 1966, but by June were below: by $11 per ton. Prices for the third quarter averaged 12 percent below the 1965 period. Little domestic meal was available before June but, when it became available, cost as much as Peruvian meal. During June-September, menhaden meal was quoted at $3-14 a ton above Peruvian fish meal at New York City. Peruvian meal averaged $152.25 per ton in September--compared to $166.20 for menhaden meal.

While prices of most important broiler feed ingredients declined $3 to $9 per ton from first to second quarter levels, soybean meal advanced $7 per ton. Hot and dry weather caused soybean crop prospects to weaken and contributed to soybean meal price advances. However, weather improved in August. The October U. S. Department of Agriculture Crop Report estimated the 1965-66 soybean crop at 927 million bushels, 8 percent above the August estimate and 10 percent above a year earlier. Soybean meal prices dropped materially in September, when the September Crop Report first indicated a large soybean crop. Prices of most other broiler protein feed ingredients declined less significantly.

Outlook

World supplies of fish meal, fish solubles, and fish oil in 1966 are expected to be about as large as 1965, depending largely on Peruvian production in late 1966. The catch of Peruvian anchovies during September is reported almost 8 times the September 1965 figure.

U. S. supplies of fish meal in 1966 were expected to be larger than in 1965. Only 12,000 tons of fish meal production or imports were needed in the last quarter to boost U. S. supplies above a year earlier. January-September 1966 supplies are only 2 percent below the 1965 annual total. However, imports of Peruvian meal may be down during the last quarter. There is some indication that a large part of the Peruvian industry may be curtailing exports to raise prices. On the other hand, if imports from other countries continue at the rate of past months, more inshipments can be expected from Canada, Chile, and South Africa.

As world demand for meat increases, both U. S. and foreign demand for fish meal and solubles as poultry and animal feed ingredients will increase. The domestic broiler production rate is expected to continue above 1965 during the third quarter of 1966. The broiler industry appears able to maintain or even exceed its recent production rate. This is indicated by a 10-percent increase in chicks placed on feed 7-14 months earlier for replacements in the U. S. broiler egg supply flock.

Soybean prices have fallen substantially since the September 9 upward revision in the 1965-66 crop estimate. The lower prices have depressed prices of most other protein feed ingredients. Further price declines are likely among some ingredients before prices firm.

Supplies of fish oil for domestic consumption and export probably will be down from a year earlier because current season U. S. production is not expected to add significantly to inventories. (BCF Div. of Economics, Branch of Current Economic Analysis, Industrial Fishery Products Section, Nov. 2, 1966.)

Shrimp Imports Rise 5.2%

Imports of all shrimp (fresh, frozen, canned, and dried) for January-September 1966 were 117.9 million pounds, compared with 112.1 million pounds in 1965 period--up 5.2 percent. Imports from Mexico totaled 38.2 million pounds, compared with 35.2 million pounds in 1965 period--up 8.5 percent.

Shrimp imports (fresh, frozen, canned, and dried) in September 1966 were 15 million pounds; they were 12.2 million pounds in September 1965. September 1966 imports of fresh or frozen heads-off shrimp (shells-on) were 9.9 million pounds; peeled and deveined, 3.8 million pounds; frozen breaded (raw or cooked), 2,550 pounds; and other types[1/] (some dried and canned) about 1.2 million pounds.

Mexico shipped 4.4 million pounds (compared with 3.7 million in September 1965): 3.1 million fresh or frozen heads-off shrimp (shells-on); peeled and deveined 1.3 million; and other types, 82,375 pounds.

1/Imports of "other types" were peeled in airtight containers or canned (217,946 pounds); cooked but not breaded (268,428 pounds); dried (15,872 pounds); and unspecified (736,292 pounds).

Can Shipments for Fishery Products Increase

During January-August 1966, 2,153,668 base boxes of steel and aluminum were used to make cans shipped to fish and shellfish canning plants. During the same period in 1965, 2,077,256 were used.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "Base box" is an area of 31,360 square inches--equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by using factor 23.7 base boxes per short ton of steel.
Source: U. S. Department of Commerce, Bureau of the Census.

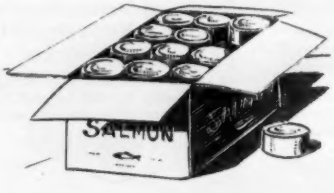
Defense Department Changes Finfish Purchases

Total purchases of the Department of Defense (DOD) this year are about the same as 1965. A sharp drop in canned fish purchases was offset by a substantial gain in purchases of fresh and frozen fish products. Haddock portions have been the 1966 volume leader--double the quantity bought in a comparable period of 1965. Tuna, 1965's leading item, was down 60 percent in 1966. This loss was offset partly by larger salmon purchases.

DOD purchases of fresh and frozen fish products account for roughly 3 to 4 percent of the total domestic market for purchases of comparable items, and about 1½ percent of canned items.

Canned Salmon on USDA'S "Plentiful List"

Canned salmon is on this month's Department of Agriculture "List of Foods in Plentiful Supply." The list will be distributed to newspapers, radio and TV stations, and other media to apprise them of the canned salmon supply situation.



Also, USDA will ask food retailers, brokers, and distributors to promote and merchandise canned salmon. BCF's fishery marketing specialists and home economists will follow up by contacting local cooperators to ask support in getting the message to homemakers.

Marketing

SURVEY SHOWS FISH PRODUCTS MORE POPULAR

Fishery products are becoming more popular with consumers, according to market studies conducted by Gorton's of Gloucester, Mass., a leading New England fish-processing firm.

Three of every 10 homemakers are more inclined to serve fish and seafood today than they were just 2 or 3 years ago, the survey shows. There is a continuing interest in serving fishery products among Catholic and non-Catholic families. The possible end of "fish on Friday" for Catholics has not affected this interest.

The survey was undertaken when the fishing industry became alarmed by rumors that Catholics might be allowed to eat meat on Friday. The results among Catholic homemakers were so reassuring that Gorton's enlarged its consumer study to include a representative sampling of American housewives. Among Catholics only, 80 percent said they will continue to serve fishery products even if the Friday ban is lifted. And almost 75 percent will abstain from meat one day a week even if the Church no longer requires it.

9 of 10 Homemakers Serve Fish

A general sampling of homemakers shows that 9 out of 10 serve fishery products. Of

this group, about two-thirds serve it one or more times weekly; in addition, as many as 8 out of 10 frequently order it when eating out.

The survey shows that 7 of 10 homemakers prefer eating fish in a restaurant because they do not like or know how to cook it. Paul M. Jacobs, executive vice president of Gorton, said: "The finding presents a major challenge to the trade. We are facing a situation where we must educate the American homemaker that preparing fish and seafood is now just as easy as preparing any other food. She must be taught that the new frozen fish and seafood entrees and appetizers have eliminated the need for traditional preparation. All she has to do is heat and serve."

At present, 6 of 10 consumers buy frozen fishery products, but only 2 of 10 believe they buy the frozen more often than fresh or canned. Mr. Jacobs added: "The homemaker must be taught that when she buys a 'cook while frozen' fish or seafood product she is buying a product that retains all of its original freshness. We can increase the frequency with which homemakers buy the frozen products if we can get this message of convenience plus taste plus freshness to the American housewife."

Editor's Note: Meatless Fridays ended for U. S. Catholics on December 2, 1966.

Bluefin Fishery Sets Record

The U. S. west coast bluefin fishery reached the highest production total since it began in 1919. By September 24, the estimated catch was 33,708,000 pounds--almost 2 million pounds more than the previous record year. The 1966 record was attributed to: high fishing effort; the recent addition of modern high-capacity vessels that extended the fleet's range, both offshore and to the south; favorable fishing weather, particularly in early summer; and the unusual abundance of bluefin.

Albacore Season Nears Record in Northwest But Poor in California

Near-perfect late summer weather and smooth seas contributed to a near-record albacore season in the Pacific Northwest. On September 28, Oregon-Washington landings were an estimated 18,224,000 pounds, only 19,326 pounds less than the 1945 record.

But California landings were only 10,352,000 pounds--one of the poorest season since 1945.

This unusual distribution of albacore was due to the very early warming in the Pacific Northwest, so the fish either by-passed California waters or did not linger long enough in their northward migration.

1965 Great Lakes Landings Same as 1964

The U. S. landings of Great Lakes fish in 1965 were 55.9 million pounds, about the same as 1964. Also, Canada's Great Lakes landings totaled about 46.9 million pounds. About half the U. S. catch came from Lake Michigan; almost all the Canadian catch was from Lake Erie.

Some First-Half 1966 Landings

MICHIGAN: From January-July 1966, the commercial catch was 2,313,000 pounds above the same period in 1965. Carp, chubs, and lake herring production decreased 190,700, 648,000, and 143,700 respectively. Alewife catches were up 2,886,900 pounds; smelt, 216,100 pounds; and whitefish, 290,800 pounds.

WISCONSIN: During January-June 1966, alewife catches decreased 2,101,500 pounds; chubs, 268,000 pounds; and yellow perch, 165,800 pounds. The only large gains were made by carp and suckers--124,700 and 147,000 pounds. Several large alewife producers probably have not reported.

OHIO: From January-July 1966, landings were only slightly higher (39,400 pounds) than same period of 1965. However, certain spe-

cies varied considerably from 1965: Carp landings were up 394,800 pounds; catfish catches were down 227,000 pounds; sheepshead production was off 1,777,100 pounds; white bass harvest increased 165,600 pounds; yellow perch landings rose 1,566,800 pounds; and yellow pike production declined 64,600 pounds.

Spacecraft May Help Increase Fish Catch

Space vehicles of the future may be used to help man catch more fish from the oceans, Under Secretary of the Interior Charles F. Luce said October 5 to the Atlantic States Marine Fisheries Commission at Portland, Me. Mr. Luce noted that BCF is looking intensively to new developments to increase the efficiency of the U. S. fishing fleet.

"One interesting aspect of this is the possible use of spacecraft to obtain oceanographic and fishery data," Mr. Luce added. "Experiments and feasibility studies underway now in the use of spacecraft include determination of sea surface temperature using infrared detectors, radar detection of surface water disturbances caused by surface feeding fish schools, estimation of wave height by radar, detection of chemical fish trails at the surface of the water left by migratory schools of fish. . .and direct spotting of large marine mammals by high resolution photography. American astronauts have been briefed on fishery and oceanographic research and they have already supplied us with much useful information."

Under Secretary Luce predicted that the total consumption of commercial fish and fishery products in the United States, both from domestic and imported sources, will jump to nearly 28 billion pounds a year by the year 2000. The present consumption is about 12 billion pounds.

The Department of the Interior's Fish and Wildlife Service is the official research agency for the Atlantic States Marine Fisheries Commission--the Nation's oldest interstate marine fishery organization, founded by interstate agreement in 1941.

TV Camera Shows Tests at 45,000 Feet

A television camera has been developed by its Instrumentation Department that shows effects of tests conducted at simulated depths down to 45,000 feet, says the U. S. Naval Oceanographic Office. The camera operates from the outside of a high-pressure test-and-evaluation vessel and relays a clear picture to a TV monitor. The picture shows what is happening to instruments having to withstand pressures in the ocean's deepest known parts--up to 20,000 pounds per square inch.

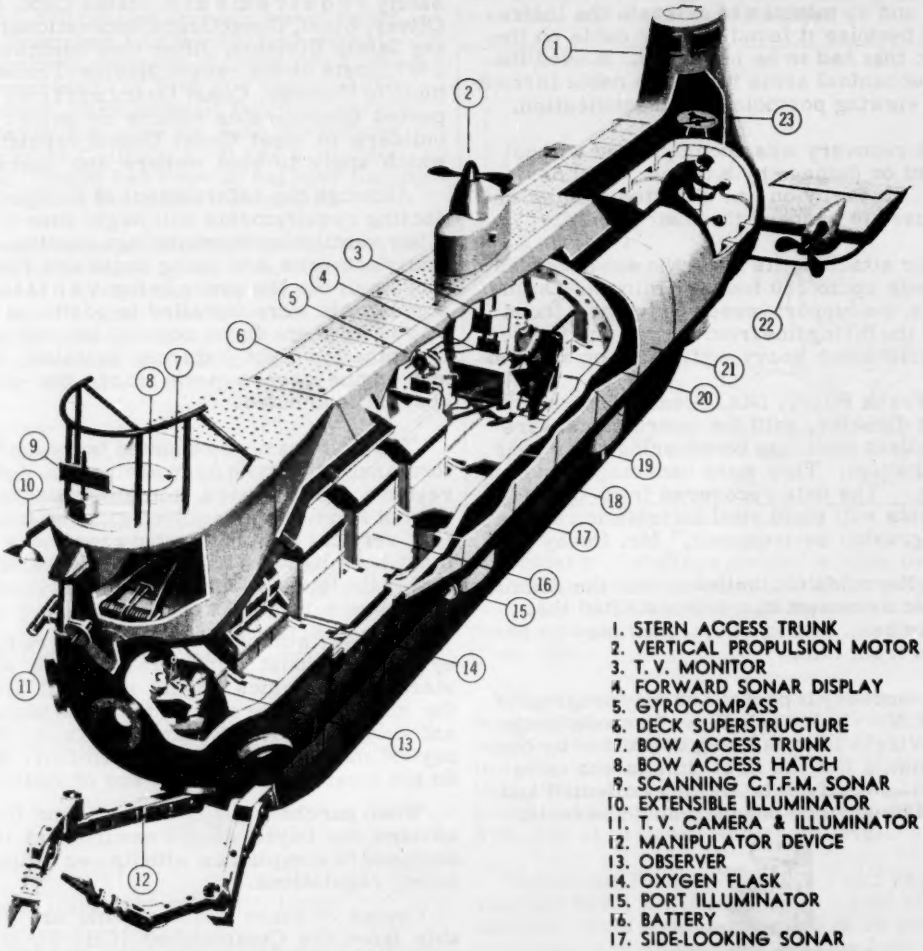
The TV camera is light and compact enough to be handled easily by one man, but the test vessel weighs 18 tons and has a plug-type cover weighing 4,000 pounds. The test device is capable of accepting instruments up to eight feet in length.

The closed-circuit TV monitoring system clearly shows how instruments will react when subjected to pressures claimed by manufacturers. "Some instruments disintegrate, others collapse, but many perform as claimed," William L. Bryan of the Naval Oceanographic Office states. "It is better to test our instruments here in a laboratory, rather than risk having a failure at sea. Savings in time and money are great, in addition to averting any serious injuries to personnel."

"Aluminaut" Recovers Instruments From Ocean Bottom

"The deepest known search and recovery mission has been successfully accomplished for the U. S. Navy by the Aluminaut, the world's deepest diving submarine," its owner, the Reynolds Co., reports. Under contract to the Naval Oceanographic Office (NOO), the 51-foot, 6-man, all-aluminum sub set a record by performing a 3,200-foot ocean-bottom search for oceanographic instruments lost over a year ago off St. Croix, Virgin Islands. The sub recovered the 2,100-pound package of instruments in 3,150 feet of water in mid-October.

The Reynolds Co. considers the search part of the mission the most difficult. On the first dive, October 12, the Aluminaut lo-



1. STERN ACCESS TRUNK
2. VERTICAL PROPULSION MOTOR
3. T. V. MONITOR
4. FORWARD SONAR DISPLAY
5. GYROCOMPASS
6. DECK SUPERSTRUCTURE
7. BOW ACCESS TRUNK
8. BOW ACCESS HATCH
9. SCANNING C.T.F.M. SONAR
10. EXTENSIBLE ILLUMINATOR
11. T. V. CAMERA & ILLUMINATOR
12. MANIPULATOR DEVICE
13. OBSERVER
14. OXYGEN FLASK
15. PORT ILLUMINATOR
16. BATTERY
17. SIDE-LOOKING SONAR (UNDER BALLAST TANK)
18. KELL SUPERSTRUCTURE
19. SHOT BALLAST SOLENOID
20. SKIPPER
21. BALLAST TANK
22. PORT PROPULSION MOTOR
23. STERN ACCESS HATCH

cated the instruments one hour and 56 minutes after it reached the bottom. The 3 NOO scientific observers on board inspected the 2,900-ft. tangled, expensive instrument array to formulate recovery plans.

On the second dive, the Aluminaut took 3 hours and 51 minutes to relocate the instruments because it found another cable on the bottom that had to be identified. It used its two mechanical arms to lift the cable in front of the viewing portholes for identification.

The recovery was accomplished without incident or damage by a unique spool device attached to the nylon line and steel cables that were used to suspend the instruments.

After attaching its hook, the sub ascended at speeds up to 150 feet per minute. On the surface, the support vessel Privateer transferred the lifting line from the sub and hoisted the delicate but heavy equipment on aboard.

R. Frank Busby, NOO oceanographer and project director, said the instruments were in excellent condition considering their year on the bottom. They were undamaged and operating. "The data recovered from the instruments will yield vital information on the oceanographic environment," Mr. Busby said.

The Reynolds Co. believes that the Aluminaut's achievement has demonstrated that what has been lost to Davy Jones may be recovered from him.

The recovery is part of a survey program of the U. S. Navy's Atlantic Fleet Weapons Range off the Virgin Islands being conducted by the Aluminaut. For the first time, a sub is being used to verify data already collected and deduced by surface oceanographic vessels.

1967 Small Boats Better Equipped, Says Coast Guard

The Coast Guard is pleased with the efforts of the boating industry to improve its products and comply with Federal boating safety requirements, states Capt. David Oliver, Chief, Coast Guard Recreational Boating Safety Division. After they examined the 1967 boats at the recent Marine Trades Exhibit in Chicago, Coast Guard officers reported considerable efforts by most boat builders to meet Coast Guard regulations, which apply to boat owners and operators.

Although the enforcement of compartment ducting requirements will begin June 1, 1967, a few ventilation shortcomings continue. Some manufacturers are using ducts and fixtures too small for the space being ventilated. Some cowls were installed in positions that blocked them from normal air currents. Combination light fixtures, curtains, seats and engine covers were among the air flow obstructions noted.

The officers also reported increased conformance with proper navigation lighting regulations. However, some manufacturers did not know of the requirements for a three-foot vertical separation between the white mast head light and the colored lights, specified in the International Rules of the Road for motorboats under 40 feet.

On vessels displaying the lighting required by the Motorboat Act of 1940, some white stern lights, which should show all around the horizon, were obstructed by windshields and canopies. A few fixtures display light beyond the permitted arc of visibility. Some do not meet the prescribed arc of visibility.

When purchasing a boat, the Coast Guard advises, the buyer should ensure that it is equipped in compliance with its own and state safety regulations.

Copies of these requirements are available from the Commandant (CHS-2), U. S. Coast Guard, Washington, D. C. 20226, and the state boating offices.

STATES

California

ANCHOVY LANDINGS TOTAL 2,500 TONS

About 2,500 tons of anchovy were landed through November 1 in the 1966-67 experimental anchovy reduction fishery, the California Department of Fish and Game (DFG) has reported. DFG said all landings were in the Monterey Bay area (in Zone 5) offshore from northern California. It has a 10,000-ton quota. There has been no anchovy fishing for reduction in the other four zones.

The experimental fishery, in its second year, was established by the State with a maximum take of 75,000 tons. The fishery opened October 15, 1966, and will close April 30, 1967. The fishery may be closed on 48 hours' notice if it threatens the resource or quota is reached in any one of the five zones.

The other quotas are: Zone 1, Pt. Conception-Hueneme area, 10,000 tons; Zone 2, San Pedro area, 10,000 tons; Zone 3, San Diego area, 10,000 tons; and Zone 4, offshore from southern California, 35,000 tons.

Reporting on its anchovy tagging program, DFG said 47,400 anchovies were tagged from October 5-November 5. The total of tagged fish now is 85,200. The program is designed to learn more about anchovy populations and movements.

DFG also is experimenting to develop new techniques to improve the recovery of tags.

Louisiana

1965 LANDINGS HIT RECORD HIGH

Commercial landings of fish and shellfish in Louisiana coastal and inland districts reached a record high of 798.9 million pounds valued at $38.4 million--up 95.3 million pounds (14 percent) and $3.7 million (11 percent) over 1964. Important gains were made in catches of menhaden, shrimp, crabs, and crawfish. Louisiana again was the Nation's leading producer; it ranked fourth in value of landings.

Shrimp: Landings were nearly 62.6 million pounds, heads-on (39.8 million pounds, heads-off), worth $19.6 million. Compared with 1964, this was an increase of 5 percent in volume and 4 percent in value.

Fishing districts of Louisiana.

Oysters: Landings yielded a little over 8.3 million pounds of meats with an ex-vessel value of $2.4 million--a decrease of 27 percent in volume and 19 percent in value from 1964.

Blue Crab: Hard blue crabs were plentiful in most areas. Landings of 9.3 million pounds ended a downward trend which began in 1962; landings were 63 percent greater than 1964. Processors produced 578,000 pounds of fresh-picked crab meat worth $732,000 at primary wholesale level.

Industrial Fish: Menhaden landings reached 682.4 million pounds, valued at $11.8 million. This was an increase of 14 percent in volume and 30 percent in value over the 1964 catch. They were second to 1962's record catch, and had a record ex-vessel value.

Finfish: Landings used for human consumption were 14 million pounds worth $2.5 million--down 1.7 million pounds (12 percent) from 1964 while the value was about the same.

Crawfish: The harvest of 8.8 million pounds valued at a little over $1.8 million put it in fourth place among the State's leading species in volume and fifth in value.

Maryland

ANCIENT OYSTER SHELLS FOUND

The Department of Chesapeake Bay Affairs has proof that some oyster shells it recently dredged up were flourishing at the time of the Roman Empire.

Fred W. Sieling, chief of the Department's resources management division, said the Geochron Laboratories, Inc., of Cambridge, Mass., conducted carbon 14 tests to determine their age.

The tests proved that oyster shells in a deposit 4 miles north of the Chesapeake Bay Bridge were thriving in 140 B.C.

The shells appear no older than any other shell. They were dredged up from 15 feet below the bottom, said Sieling, from a 10-foot-thick deposit. The half shells are much larger; some weigh well over a pound each.

Some shells were found in a 20-foot-thick deposit, which indicate that sometimes there was a high mortality rate. They were 1,845 years old.

Sieling said the death rate could have been due to drills, boring sponges, a freshet that lowered the saline level beyond tolerance, or even an ancient form of the MSX disease.

Michigan

EDA PROCESSING PLANT COMPLETED

A full-scale pilot processing facility has been completed at Hancock, Mich. It is a project of the Commerce Department's Economic Development Administration Technical Assistance Project for the Lake Superior area. The facility is being operated by Inland Seas, Inc., a corporation formed by processors on Lake Superior. The operation is designed primarily to produce raw, individually quick-frozen unbreaded and breaded cisco and chub fillets, and gutted and headed smelt products. BCF staff met with Inland Seas, Inc., in October to complete details of the operation.

* * * * *

MEAL PLANT PLANNED

A fish meal plant will be built at Menominee this winter. It will greatly increase the potential for harvesting more Lake Michigan alewife. Alewife production this year is already about 20 million pounds--up substantially from last year's 14.1 million pounds. Lake Michigan trawlers are expected to land 3 to 5 million pounds more by December 31, 1966.

Missouri

FEDERAL AID PROJECT PRODUCTIVE

Under the Federal Aid project, the State produced more than 62 million goldfish, bullheads, and various species of minnows--and over 5 million catfish, rainbow trout, bass, and panfish. One goldfish breeder alone reported he employed 67 persons, including 7 fishery biologists.

North and South Dakota

ESTIMATE FISH IN OAHE RESERVOIR

Based on the recovery of marked fish in the commercial fishery and trap net catches, about 8,641,000 pounds of bigmouth buffalofish were estimated to be in Oahe Reservoir in 1965. The reservoir is on the Missouri River in North and South Dakota. Without further recruitment, the population will support from 300,000 to 900,000 pounds of commercial production annually for the next 10 years--but will drop sharply below 300,000 after that.

The standing crop of fish, age-group II and older, was estimated to be 52 million pounds, or 239 pounds per acre. Carp made up half, but their average weight in September 1966 was only about 2 pounds. Only 1.5 percent of the commercial stocks was removed by the commercial fishery in 1964-1966.

The commercial fishery landed 40,000 pounds of buffalofish, 5,500 pounds of carp, and 2,500 pounds of carpsuckers in September. Most were taken by hoop net in the North Dakota waters of Oahe Reservoir.

Oregon

WILLAMETTE CHINOOK SET RECORD

Fish Commission biologists reported a record count of fall chinook in the Willamette River and its principal tributaries above Willamette Falls. A BCF-funded count showed more than 1,000 fall chinook above the Falls at Oregon City from August 29 to October 7. There were only an estimated 200 fish in 1965, fewer in previous years, including a low of 9 in 1960. The count was especially significant because, historically, there has been no appreciable run of fall chinook in this area.

* * * * *

COHO CATCH IN COLUMBIA IS BEST SINCE 1929

The best catch of coho salmon, at least since 1929, in the Columbia River late fall commercial fishery was recorded this year, the Fish Commission announced.

As the season on the Columbia closed October 27, the catch was near $4\frac{1}{4}$ million pounds. The coho fishery on Youngs Bay, which enters the Columbia below Astoria, continued until October 31. Youngs Bay catches are included in Columbia's landing reports. Catches there during the final week of fishing boosted total to about $4\frac{1}{4}$ million pounds.

Operation Coho Transplant Underway

For the third consecutive year, Fish Commission hatcheries are being swamped with more coho than they need. The Commission plans to transfer up to 50,000 surplus adult coho from the hatcheries to suitable streams. More than 60,000 were transplanted during the first 2 years: 1964 and 1965.

Generally, the fish are being released into streams that do not support coho runs but potentially can; streams with recent clearance projects or fishways completed; and in streams above impassable falls that have fishways scheduled for construction. Adult coho are hauled to other waters only after the hatcheries' needs of about 35,000,000 eggs are satisfied, and sufficient fish have escaped beyond the hatcheries to use the natural spawning areas.

In addition to Operation Coho Transplant, the Commission will furnish other state and Federal agencies with at least 12,000,000 coho eggs. After yet another excellent year for sport and commercial fishermen, the tremendous number of available fish points to a bright future for the coho fishery.

* * * * *

SEEKS TO ESTABLISH SOCKEYE

The Fish Commission has begun an experimental program, BCF financed, to stimulate the sockeye salmon fishery. The program is initially set up on a two-year basis at $20,000 per year.

Juvenile sockeye, released into reservoirs, will be studied for survival, growth, competition with other fish, food habits, distribution, length of stay, and how successfully they leave the reservoirs. The future of the experiment will be based upon the findings.

Sockeye have to stay in fresh water lakes for at least one year before migrating to the sea. Although Oregon streams with accessible lakes in the headwaters are few, it is hoped the reservoirs will replace the lakes needed under natural conditions. Fish for the new program will be obtained from the 1,000,000 sockeye eggs recently received from the Canadian Department of Fisheries. It was decided to use fish from the British Columbia area because its sockeye are almost fifty percent larger than Columbia River sockeye. Fish from the Adams River runs will be used because they migrate at about the time when conditions in the Willamette System are best.

The fish will be reared at the Fish Commission's Ox Bow Hatchery and released as fingerlings into Cougar Reservoir on the South Fork of the McKenzie River, and into North Fork Reservoir on the Clackamas. At present, biologists are investigating several other reservoirs throughout the state, principally in the Willamette Basin, to see if they

would offer suitable sockeye habitat for an expanded program.

Willamette System is Key

The new program is geared principally to the Willamette System because the Columbia River basin has lost extensive sockeye spawning grounds to hydroelectric development.

Insufficient escapement over the dams and poor passage of downstream migrants have drastically reduced the runs. The commercial fishing season on Columbia sockeye was limited to five days in 1964; for the first time in the fishery, commercial fishing for it was not allowed in 1965. The closure was based upon poor escapement in 1961--less than one-fourth the established goal.

UNIQUELY-SHAPED NORTHERN QUAHOG SPECIMEN DISCOVERED

A uniquely-shaped, three-inch long specimen of the northern quahog, Mercenaria mercenaria, was found this past winter in the Wickford Cove area of Narragansett Bay by a high school senior who is an amateur shell collector. The discovery was reported by Dr. Carl N. Shuster, Jr., Director of Northeast Shellfish Sanitation Research Center, U. S. Public Health Service, Narragansett Bay, R. I.

The odd shape of the shell raised a number of questions. How often does this shape occur among quahogs? Are there records of other such specimens? Since quahogs are burrowing mollusks, how well could such an asymmetrical specimen dig? Would this shape affect its ability to survive?

An initial search for information indicated that there are a few such specimens in museum collections, but the ones seen thus far are not as asymmetrical as the Narragansett Bay specimen. The only scientific article about such a shell dealt briefly with the southern quahog, M. campechiensis. It is assumed, therefore, that such shells if not rare are certainly not common.

Burrowing bivalves, of which the quahog is one, tend to have right and left valves matched in size and shape, whereas non-burrowing mollusks like the oyster have unequal valves. It is surmised, therefore, that an asymmetrical specimen like the one found would have difficulty in burrowing.

The Narragansett Bay specimen resembled closely some ancient fossilized genera of non-burrowing mollusks, especially Exogyra and Gryphaea. Whatever happened to the present quahog specimen perhaps triggered a latent genetic mechanism for shell shape that has been dominant in the oyster family for millions of years.

Dr. Shuster would appreciate hearing from any reader who has seen a misshapen quahog of this type and would be particularly interested in obtaining a live specimen. (Maritimes, vol. X, no. 2, Spring 1966.)

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

North Pacific Fishery Investigations

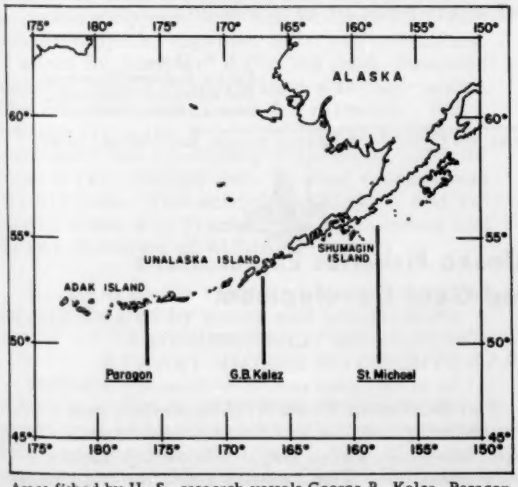
RESULTS OF SALMON
RESEARCH CRUISES, SUMMER 1966

BCF conducted three research cruises in the North Pacific Ocean during June-September 1966. The objectives: to study distribution and relative abundance of immature sockeye and chum salmon, compare indices of relative abundance from catches of gill nets and purse seines fished simultaneously, and to determine the percentage of salmon lost from gill nets during fishing (dropouts).

These cruises, which represented the Seattle Biological Laboratory's greatest effort in manpower and vessels in several years, were terminated in early September after successfully accomplishing their major objectives.

The charter vessels Paragon and St. Michael and the Bureau's George B. Kelez fished gill nets of various meshes. Typically, a string of gear consisted of 12 to 14 50-fathom shackles of $2\frac{1}{2}$- and $3\frac{1}{4}$-inch mesh, and 12 to 16 of $4\frac{1}{2}$- and $5\frac{1}{4}$-inch mesh (stretched measure).

A total of 119 gill net sets made in the three sampling areas (chart) produced a catch of 15,750 salmon and steelhead trout.



Areas fished by U. S. research vessels George B. Kelez, Paragon, and St. Michael, June-September 1966.

Sockeye salmon were predominant near Adak Island (Paragon), whereas chum salmon dominated along long. 167° W. (George B. Kelez) and long. 158° W. (St. Michael).

Previous studies showed that in the summer immature sockeye and chum salmon in these areas are generally present to lat. 49° N. Thus, near Adak Island, these species are found to a distance of 150 miles offshore; at long. 167° W., they are caught nearly 260 miles from shore and, at long. 158° W., they are present to approximately 430 miles offshore.

South of Adak Island, along long. 176° W., 1-winter-at-sea immature sockeye salmon were most abundant 31-45 miles offshore (lats. 51°30' N. to 51°00' N.), although abundance was only slightly less to 60 miles offshore. Abundance was at a peak July 1-10 and July 21-31. Fishing south of Unalaska Island, along long. 167° W., indicated that these young sockeye salmon were about equally abundant throughout the summer; their peak abundance occurred 90-180 miles from shore (from lats. 52°30' N. to 50°30' N.). Similarly, along long. 158° W., no peak of abundance of 1-winter-at-sea sockeye was detected. This age group occurred throughout the sampling area.

The older immature sockeye salmon (2- and 3-winters-at-sea) were distributed somewhat differently from the younger fish. South of Adak, these older fish were most abundant 31-90 miles from shore (lats. 51°00' N. to 50°15' N.); catches were too small, however, to demonstrate significant peaks of abundance. To the east, the older sockeye salmon along long. 167° W. predominated in the same area as the younger fish (90-180 miles offshore); they were more abundant late than early in the sampling season. In contrast, older sockeye salmon along long. 158° W. were abundant during early and late August and predominated from 260 to 360 miles (lats. 52°30' N. to 50°30' N.) south of the Alaska Peninsula.

Catches of chum salmon (age-2 immature) along long. 176° W. were greatest from July 1-10 in an area 31-45 miles offshore. Along long. 167° W., however, few young chum salmon were caught and no period of peak abundance was detected. At the easternmost fishing stations (158° W. long.), 2-year-old chum

salmon, though not numerous, were most abundant in late August in the northern and southern extremes of the sampling area.

Immature chum salmon (3 years and older) were scarce along long. 176° W., and catches of these older fish indicated no peak of abundance by time period or area. Along long. 167° W., the older chum salmon were much more abundant than the young; their peak of abundance fell between August 1 and 10; they were in similar abundance throughout the sampling area, except for slightly lower concentrations at the very southern stations. Abundance of chum salmon along long. 158° W. was similar throughout the sampling period; greatest numbers occurred 300-360 miles offshore (lats. 51°30' N. to 50°30' N.).

Comparisons of relative abundance between the three sampling areas (table) indicated that 1-winter-at-sea sockeye salmon were most abundant along long. 176° W., and were least abundant along long. 158° W. On the other hand, 2- and 3-winter-at-sea sockeye salmon were least abundant near Adak Island and most abundant along long. 158° W. Both the younger and older sockeye salmon had their peak of abundance at similar latitudes in the three sampling areas.

Average Catch of Immature Sockeye and Chum Salmon Per Shackle for Three Areas of the North Pacific Ocean, July-September 1966

Area (Long.)	Sockeye Salmon		Chum Salmon	
	1-Winter-at-Sea	2- or 3-Winters-at-Sea	2-Year-Old	3-Year- and Older
176°22' W. (Paragon)	3.53	1.07	1.84	0.58
167° W. (George B. Kelez) . . .	2.29	1.31	1.09	3.25
158° W. (St. Michael)	1.50	2.45	0.98	2.91

The relative abundance of chum salmon was similar to that of sockeye salmon. The 2-year-old fish were most abundant near Adak Island and least abundant along long. 158° W. The older chum salmon were more abundant along long. 158° W. and 167° W., and least abundant along long. 176° W.

Comparison of Purse Seine and Gill Net Catches

Comparative fishing was conducted with gill nets (vessel Paragon), and purse seines (vessel Storm, Fisheries Research Institute) to determine if the two forms of gear similarly reflected the relative abundance of salmon. Gill nets were fished at night and purse seines during the day in the same area.

Purse seine and gill net catches of sockeye salmon did not reflect relative abundance in a similar manner. Catches of chum salmon indicated little relationship between the two types of gear.

Studies of Dropouts

Percentages of salmon caught in a gill net which are not present when the gear is hauled (dropouts) were estimated from periodic inspection of the nets during normal fishing. The procedure used was to patrol the nets at night from small boats, mark the location of gilled salmon, and determine their presence or absence at later patrols and when gear was hauled. Portable spotlights were used to locate fish in the net.

Dropout rates were substantial (49 percent) when measured over a period of 8-10 hours. After 2-2½ hours, dropout rates were about 22 percent. The loss rate was 4 percent after one-half hour. Salmon known to be in the nets at least 2½ hours continued to drop out. The loss is attributed to escape, falling out of the nets, or to predation.

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Note: See Commercial Fisheries Review, July 1966 pp. 40-41.

Alaska Fisheries Explorations and Gear Development

R/V "SABLEFISH" CONTINUES GEAR STUDIES ON SHRIMP TRAWLS

The BCF chartered R/V Sablefish has completed phase two of the shrimp try-net experiment in Tutka Bay. Three try-nets were sampled. The results indicate a definite possibility of developing a selectively fishing

shrimp trawl. Various trawl modifications suggested from these results have been incorporated into a fourth try-net, which will be test-fished in Kasitsna Bay.

Central Pacific Fisheries Investigations

"CROMWELL" STUDIES SONAR TECHNIQUES TO TRACK TUNA

BCF'S Townsend Cromwell cruised off the leeward coasts of Oahu and Hawaii during August to conduct sonar studies (Cruise 26). It had 5 major missions:

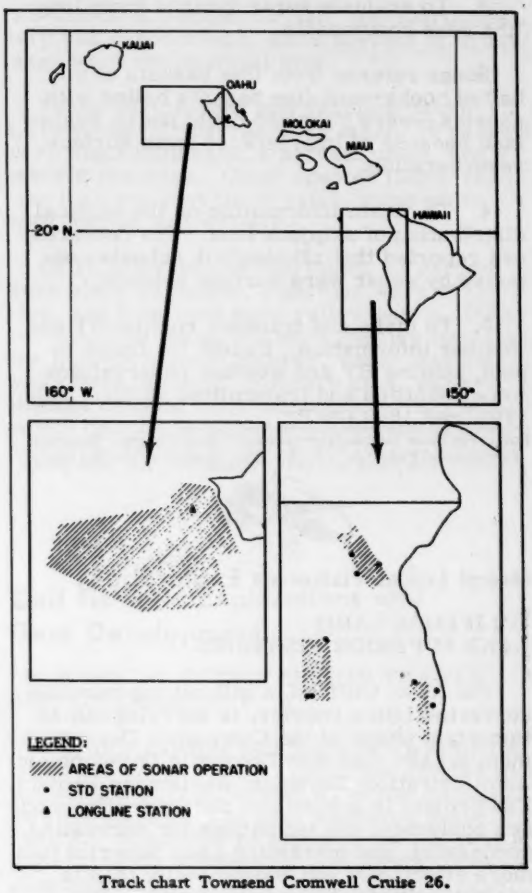
1. To develop techniques for tracking tuna schools with continuous transmitting, frequency-modulated (CTFM) sonar, with emphasis on large skipjack.

Sonar returns from three dead skipjack, supported singly at the surface by airborne balloons, showed echo strength was affected by changes in the fish's dorsoventral orientation. Returns were strongest when the fish were in the normal swimming position; when they were canted, returns were considerably weaker.

In 50 hours of searching for tuna schools, the sonar contacted 3 schools of small skipjack tuna (less than 8 pounds), one school of 10-20 pound skipjack, and one school of 10-20 pound skipjack, together with yellowfin tuna of about 50 pounds. As in the past, contact with the small skipjack tuna was very short. The longest contact was 4.5 minutes. The returns from the school of larger skipjack tuna were intermittently masked by returns from a very choppy sea, so that contact was quickly lost. The school of skipjack and yellowfin tunas was tracked for 18 minutes and up to a distance of 410 meters.

2. To examine relation between depth of targets located by sonar and temperature profile of the environment.

Stations planned over various parts of the counterclockwise eddy west of Hawaii were abandoned because examination of temperature profiles indicated that it was directly downstream of Alenuihaha Channel. In their stead, three other stations were selected (track chart): one over a bank that sloped from 500 to 1,500 fathoms in a somewhat exposed area, another over a similar bank but in a well protected area, and a third in an exposed area with the bottom at 2,300 fathoms. A sonar search pattern of 24-hour duration was executed three times at each station. STD casts were made at the end of each 24-hour search.



Track chart Townsend Cromwell Cruise 26.

A total of 879 targets was located: of these 44 were identified as porpoises, 1 as marlin, and 1 as a school of skipjack tuna. Rates of target contacts during night search were 2.5 per hour for surface targets and 0.5 per hour for non-surface targets; during day search, 3.6 and 1.7 per hour, respectively. Surface targets, 77 percent of contacts, occurred most frequently between the hours of 0800 and 1200. The depth distribution of the non-surface targets appeared to be centered at, or just above, the salinity maximum.

3. To evaluate sonar returns from long-line gear components.

Sonar returns from five baskets of unbaited hooks--and five baskets baited with sauries--were poor and could not be evaluated because of interference from surface reverberation.

4. To obtain information on the vertical distribution of skipjack tuna. The researchers reported that all skipjack schools contacted by sonar were surface schools.

5. To make and transmit routine BT and weather information. Except for times in port, routine BT and weather observations were recorded and transmitted at 0000, 0600, 1200, and 1800 GMT.

Note: For more information, contact: Area Director, Bureau of Commercial Fisheries, P.O.B. 3830, Honolulu, Hawaii 96812.

Great Lakes Fisheries Explorations

"CLIFFORD" AIDS
LAKE SUPERIOR FISHERIES

The A. E. Clifford, a gill net tug recently converted into a trawler, is carrying out an important phase of the Commerce Department's Lake Superior Economic Development Administration-Technical Assistance Project. The project is testing and demonstrating modern equipment and techniques for harvesting, processing, and marketing Lake Superior fish more effectively and economically than is possible with traditional operations. The vessel was converted under a cooperative agreement between Commerce and Interior Departments. BCF gives technical assistance. (Cruise Nos. 1, 2, and 3.)

The Clifford completed three 5-day exploratory fishing cruises during the third quarter of 1966. The combined cruises produced 8,490 pounds of fish: 67.5 percent chubs (mostly bloaters), 10.8 percent cisco, 9.8 percent smelt, 5.8 percent suckers, and 4.4 percent lake trout. The remaining 1.7 percent was miscellaneous, mostly burbot and common whitefish.

The vessel has fished for chubs and smelt on a part-time basis. Attempts to establish markets for the relatively small bloater chubs, which are readily available to trawls, met with little success until recently. As a result, fishing effort and catches have been nowhere near the actual potential. The vessel produced 27,611 pounds of fish during only 60 hours of fishing over 4 months, mainly chubs (82 percent), smelt (10 percent), and cisco (4 percent).

Inland Fisheries Explorations and Gear Development

"HIODON" CONTINUES
OAHE RESERVOIR STUDIES

The R/V Hiodon conducted an experimental cruise (No. 10) in Zones 3, 4, and 6 of Oahe Reservoir during September 1966. The reservoir is on the Missouri River in South and North Dakota. The vessel completed 102 drags to compare catches of three different size trawls (40 drags); to compare daytime catches with nighttime catches (16 drags); to collect biological samples (2 drags); and to effect a maximum catch of commercial species in two areas of the reservoir (44 drags).

Fishing Results: The 102 drags took 8,006 fish (age group II or older) that weighed 17,468 pounds--an average of 78 fish or 171 pounds per drag. As usual, carp dominated the catch composition: 63 percent of total weight. Buffalofish also were prominent: 23 percent of the weight. The pattern of progressively larger catches in late summer and fall was similar to 1965.

Trawl comparison drags: 40 drags were made with three trawls (35-, 45-, and 52-foot headrope) to determine possible variations between trawls in rate of catch and species composition. The trawls took fish in about equal quantity, but the 35-foot net took a smaller proportion of buffalofish and a somewhat larger proportion of carp and carpsuckers than did the other two trawls.

Day-night comparison drags: 16 drags were made to compare catches made during daytime with catches made at night in the same area and using the same gear. Four drags were made in the morning (7:00 a.m. to 9:30 a.m); six drags during late afternoon (4:30 p.m. to 6:30 p.m.); and six drags at night (8:00 p.m. to midnight). The average catch per drag during late afternoon (271

pounds) was about the same as during the night (278 pounds), but the early morning drags were considerably less productive (112 pounds). Carp comprised a larger portion of the late afternoon catch than at either of the other time periods. Carpsuckers were about the same percentage of the catch during all periods; buffalofish were a larger part of the early morning and nighttime catches than during the late afternoon; and goldeye made up over 2 percent of the catch only at night.

Commercial production drags: 44 drags were made to catch commercial species in the largest quantity possible. Results are analyzed on the quantity of fish taken per standard 15-minute drag and on "operational hours": i.e., hours required to complete trawling in a local area. Operational hours reflect shooting, dragging, and hauling time, time spent in cruising from one drag site to another in a localized area, and delays resulting from minor or routine maintenance of gear. Operational hours do not include the time required for travel from one major trawling area to another.

Most of one day was spent trawling in a "marginal production area" (upper Zone 4). Drag sites here consist of small scattered bays, so considerable time was lost in travel from one drag site to another. Seven operational hours produced only 70 trawling minutes. The take of commercially saleable fish was 65 pounds per 15-minute drag, or 43 pounds per operational hour. The commercially saleable poundage was: 84 percent carp, 10 percent river carpsucker, 5 percent bigmouth buffalo, and 1 percent channel catfish. ("Commercially saleable" are species designated commercial by the State, and are such species and sizes the local industry can sell.) All the bigmouth buffalo and 86 percent of carpsuckers were commercial size, but only 67 percent of catfish and 34 percent of carp were that large.

Twenty-four operational hours (560 trawling minutes) were spent on a prime trawling area in Zone 6. The catch of commercially saleable fish was 89 pounds per 15-minute drag, or 137 pounds per operational hour. The commercial poundage was 55 percent bigmouth buffalo, 38 percent carp, 3 percent smallmouth buffalo, 2 percent river carpsucker, 1 percent goldeye, and 1 percent freshwater drum and channel catfish combined. Nearly all buffalofish and goldeye, two-thirds of channel catfish, one-fourth of carp and carpsuckers, and 8 percent of drum taken were commercial size.

Young-of-the-year and yearling catch: Of 3,370 young-of-the-year fish taken, 90 percent were black bullheads, 5 percent drum, and 4 percent crappies. Other species taken, each less than one percent of catch, were white bass, perch, and walleye.

Of 18,360 yearling fish taken, 92 percent were black bullheads, 4 percent were crappies, and 2 percent were yellow perch. Other yearling fish taken, but each species less than one percent of total number, were: sauger, white bass, goldeye, northern pike, walleye, channel catfish, carp, bigmouth buffalo, smallmouth buffalo, freshwater drum, and burbot.

Note: For more information, contact: Base Director, Exploratory Fishing Base, BCF, 5 Research Drive, Ann Arbor, Mich. 48103.

Gulf Fisheries Explorations and Gear Development

"BOWERS" ELECTRIC SHRIMP TRAWLS ARE SUCCESSFUL

Daytime catches with the electrical shrimp trawl are about equal to nighttime catches with the standard trawl, cruise 67 of the George M. Bowers shows. The gear research vessel recently completed an electric shrimp-trawling cruise off Mississippi and Texas. Two simultaneously towed 40-foot Gulf of Mexico flat trawls were used. The starboard trawl was equipped with components of the electrical system; the port trawl with a single tickler chain. Comparison tows lasted one hour.

Daytime electric trawl catches averaged 96 percent of the night non-electric trawl catches. The weight averages of the catches were 15.5 lbs./hr. for the daytime electric trawl--and 16.2 lbs./hr. for the night non-electric trawl. The day non-electric average was 0.5 lbs./hr.--and the night electric average was 9.9 lbs./hr. The researchers are trying to take underwater motion pictures of the electrical trawl while fishing. If successful, the films should explain the lower catch rates of the electrical trawl at night.

An efficiency of 96% for the daytime electrical trawl, compared to the night standard

trawl, is a commercially productive catch rate. This catch average also adds considerable support to the success the system experienced during the Bowers cruise off the Alabama and Mississippi coasts: an efficiency of 109% for the daytime electric trawl. The catch weight averages were 17.7 lbs./hr. for the daytime electric trawl--and 16.3 lbs./hr. for the night non-electric trawl.

Cruises 66 and 67 of the Bowers show the electrical shrimp trawl to be very effective on the Alabama, Mississippi, and Texas coastal shrimping areas.

* * * * *

ATTRACTION OF ANCHOVIES TO LIGHT STUDIED

The Bowers conducted light attraction studies on anchovies in Mississippi Sound (Cruise 68) during the October "dark-of-the moon" phase--October 10-15. The objective was to experiment with a variety of light sources to determine attraction rates and behavior control of Gulf anchovies (Anchoa sp.).

Four experimental lighting arrays were used: a 90-lamp bank of incandescent lights capable of 13,500-watt output; a 2-lamp bank of mercury vapor lights with 2,000-watt output; a 3-lamp, 3,000-watt bank of incandescent lights; and single 6 VDC seal-beam lamps. Variable intensity controls were used on each unit. Experimental fishing and sampling gear included a 215-foot fine mesh purse seine, gill nets, and dip nets.

Throughout the study period, strong winds, choppy seas, and heavy turbidity greatly restricted operations, observations, and the effectiveness of light attractors. But generalized observations indicated that the mercury vapor lights were most effective in attracting both anchovies and clupeids to the vessel. By switching to the 90-lamp bank of incandescent lights, circular milling behavior was quickly established--and then the "school" could be held through successive dimming down to one low intensity lamp. Weather conditions permitted only one purse seine set that yielded about 200 pounds of anchovies, and 10 pounds of thread herring (Opisthonema oglinum), scaled sardines (Harengula pensacolae), and small numbers of harvestfish (Peprilus paru), bumpers (Chloroscombrus chrysurus); and cutlassfish (Trichiurus lepturus).

Six-bulb banks of red incandescent lights attracted primarily squids and eels. No measurable results were obtained with a five-bulb bank of blue lights.

To obtain menhaden samples, gill-net sets were made in the Sound in cooperation with BCF's Beaufort Biological Laboratory.

Note: For more information, contact: Base Director, Exploratory Fishing and Gear Research Base HQ, Pascagoula, Miss. 39567.

North Atlantic Fisheries Explorations and Gear Development

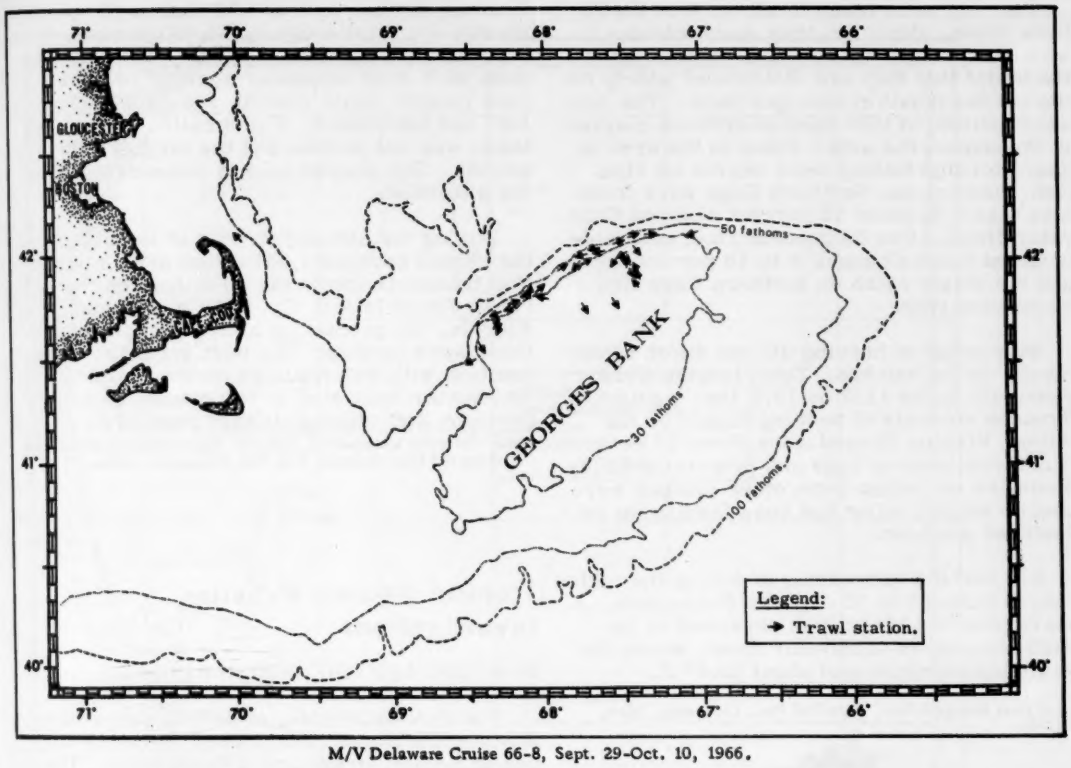
"DELAWARE" SEEKS INDUSTRIAL FISH ON GEORGES BANK

The exploratory fishing vessel M/V Delaware returned from the Georges Bank area to Gloucester, Mass., on October 10 after completing the second in a planned series of exploratory cruises for industrial fish species (Cruise 66-8, Sept. 29-Oct. 10, 1966). Thirty-three tows were made with a Dutch herring trawl specifically to evaluate herring (Clupea harengus) distribution, relative abundance, and availability to this type of gear. The major part of the survey was conducted on the northern half of Georges Bank, from Cultivator Shoal to the Northern Edge, at depths of 16 to 52 fathoms (see cruise chart). Also, electronic fish sounding and ranging transects were made both in the fishing areas and while steaming to and from Gloucester.

Commercial concentrations of herring were found in the northeastern section of the Winter Fishing Ground. A fleet of 35 to 40 foreign vessels, mostly Soviet factory-stern trawlers, was actively fishing here; estimated catches of 10,000 to 35,000 pounds were observed.

The main objectives of this cruise were: (1) to investigate the seasonal distribution and relative abundance of industrial fish (primarily herring) in the area of Georges Bank and adjacent parts of the Gulf of Maine, (2) determine the availability of these species to a Dutch herring trawl, and (3) to obtain biological and environmental data relative to collected species.

A Dutch herring trawl was used. Two types of kites (fiberglass and plywood) and varying



M/V Delaware Cruise 66-8, Sept. 29-Oct. 10, 1966.

numbers of spherical (8-inch diameter) floats buoyed up the headrope, and wooden spacers were used for roller gear.

Fishing activities were conducted in areas of suspected fish abundance--generally based on data from previous cruises and information received from Government aerial surveillance of foreign fishing activity. Echosounding and ranging transects were conducted between trawl sets and during bad weather, when fishing was impractical.

Tows with the Dutch net were made during the daytime and were usually 1-hour long at about four knots. Oceanographic data were collected at every tow, and biological specimens were examined for size, weight, stomach content, and sexual maturity from selected catches.

Results: Definite commercial concentrations of herring were found in the Winter Fishing Ground area between 41°55' N., 67°25' W. and 41°58' N., 67°28' W. at depths of about 20 to 30 fathoms. Although the vessel's maximum catch was 3,300 pounds for a 1-hour tow, a tenfold catch was observed on a Soviet vessel, probably the result of a 2-hour tow. The observed catches of several vessels of the large foreign fleet averaged over 10 thousand pounds. Their powerful modern vessels apparently experience little difficulty in handling nets that appeared twice as large as the Dutch herring trawl. A dense fog and competition for space prevented the Delaware's crew from fully evaluating the possible production from this area.

Two other areas produced fair catches of industrial fish species. Over 9,000 pounds of mixed fish, including 7,000 pounds spiny dogfish (Squalus acanthias) and 1,260 pounds herring, were caught in a 1-hour tow in 32 to 34 fathoms between the Peaked Hill Buoy and W or "E" Buoy off northeastern Cape Cod. Catches included over 2,600 pounds of mixed industrial fish, mostly herring or silver hake (Merluccius bilinearis), on northern Cultivator Shoal.

Herring were taken in all but 4 of the 33 tows made. However, they were missing in widely separated tows, which substantiates the belief that they are distributed widely on the northern half of Georges Bank. The sexual condition of this species differed markedly throughout the area: those in the area of heavy foreign fishing were nearly all ripe fish; those on the Northern Edge were from less than 5 to about 30 percent ripe; on Cultivator Shoal, 10 to 50 percent ripe; west side of Great South Channel, 0 to 10 percent ripe; and the single catch on northern Cape Cod, 50 percent ripe.

Size range of herring did not differ significantly in the catches. Total lengths were generally in the 11.0 to 12.5 inch range. Stomach contents of herring caught on the Winter Fishing Ground were about 50 percent filled with herring eggs and 50 percent empty. Stomachs examined from other catches were usually empty; a few had been feeding on unidentified plankton.

Sea surface temperatures during the cruise ranged from 55 to 58 degrees Fahrenheit. A heavy plankton bloom was observed on the northern edge of Cultivator Shoal, where the water temperature was about 55.4° F.

Note: For more information, contact: BCF Exploratory Fishing and Gear Research Base, State Fish Pier, Gloucester, Mass. 01930.

South Atlantic Fisheries Investigations and Gear Development

"OREGON" STUDIES AVAILABILITY OF SWORDFISH AND BOTTOMFISH

The R/V Oregon returned to St. Simons Island, Georgia, on September 26 after a 19-day exploratory fishing cruise off southern Georgia and the Florida east coast (Cruise 112). Objectives: to continue seasonal observations on availability of swordfish to longline gear, and to survey distribution availability of inshore bottomfish stocks by otter trawl.

Five nighttime and one daytime 50-60 basket longline (10 hooks to a basket) sets were made between the axis of the Gulf Stream east to the 1,000-fathom curve. Twenty swordfish weighing 1,678 pounds (89-lb. average) were taken in the 6 sets. Miscellaneous catches included 58 sharks (6 species mostly whitetip) weighing 10,000 pounds, 2 bigeye tuna weighing 72 pounds, and 9 specimen of 6 miscellaneous species (dolphin, blue runner, white marlin, spearfish, escolar, and lancetfish). The smallest swordfish taken was $18\frac{1}{4}$ pounds and the largest 205 pounds. The sharks caused some damage to the swordfish.

During the bottomfish part of the cruise, the vessel covered 1,067 miles of fish detection transects inside the 10-fathom curve between Jekyll Island, Ga. and Cocoa Beach, Florida. No promising bottomfish concentrations were located. The best set made in conjunction with fish tracings on the recording fathometer consisted of 860 pounds of spot, croaker, and whiting. (Chart page 24.)

Note: For more information, contact: Base Director, Exploratory Fishing and Gear Research Base HQ, Pascagoula, Miss. 39567.

Tropical Atlantic Fisheries Investigations

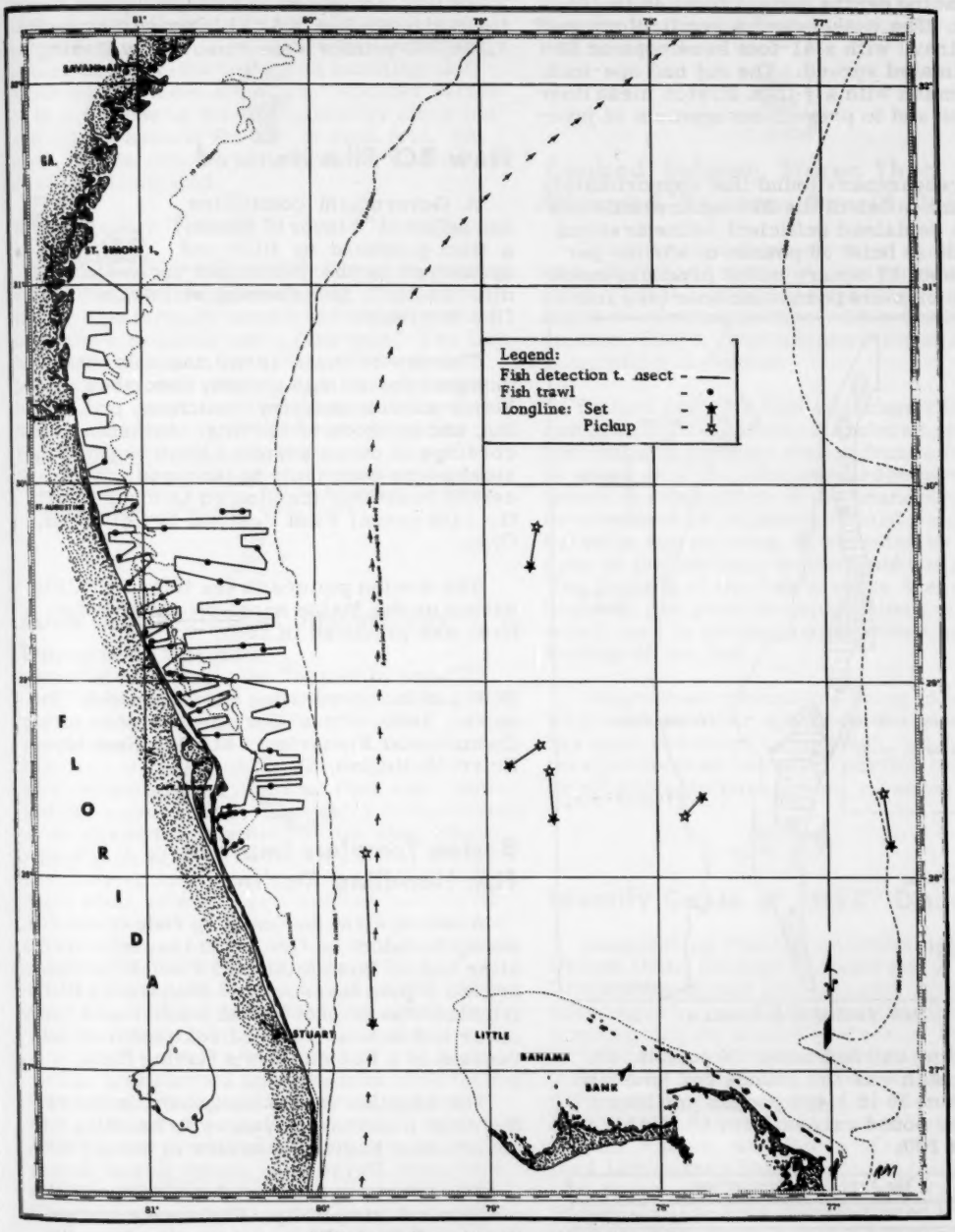
R/V "UNDAUNTED" VISITS RECIFE

The R/V Undaunted, of BCF's Tropical Atlantic Biological Laboratory, recently stopped in Recife, Brazil, on a 4-day visit. The visit followed extensive fishery and oceanographic study in the western tropical Atlantic. The staff held open house and later invited local reporters and photographers to witness a demonstration cruise around Recife. The U. S. Information Agency and local press publicized the visit and the Undaunted's work.

California's "Scofield" Samples Coastal Shrimp

The State of California's N. B. Scofield returned to San Pedro September 13 after a 5-week cruise in coastal waters primarily to sample shrimp. (Cruise 66-S-5 Shrimp.) The cruise areas were the coastal waters from Oregon border to Eureka, California, and off Point Rincon, Santa Barbara.

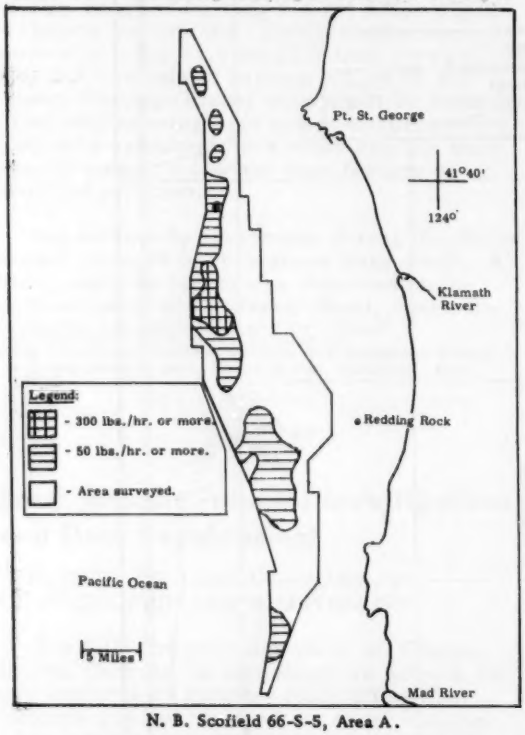
The 156 tows were randomly distributed over the 270 square-mile survey area between



R/V Oregon Cruise 112, September 8-26, 1966.

the Mad River's mouth and the Oregon border. Fishing depths ranged from 40 to 105 fathoms. The vessel used a semiballoon, gulf shrimp trawl with a 41-foot head rope or 25-foot estimated spread. The net had one-inch stretch mesh with a ½-inch stretch mesh liner in the cod end to prevent escapement of juveniles.

The researchers found that approximately 101 square miles of the 270 square-mile survey area contained sufficient concentrations to provide at least 50 pounds of shrimp per hour. About 17 square miles produced catches of 300 or more pounds per hour (see map).



N. B. Scofield 66-S-5, Area A.

Excluding catches under 34 pounds, the average catch was 162 pounds per hour and ranged from 35 to 1,496 pounds per hour. Counts per pound ranged from 57 to 151; the mean was 100.

The Year-Class Composition	
Year-Class	Percent by Number
0 (1966)	63.6
I (1965)	22.1
II (1964)	13.8
III (1963)	.5

Estimated total poundage on the bed was 2,210,000, compared to 5,086,000 pounds estimated on the bed in April. During this period, 1,225,000 pounds were removed by fishing.

New BCF Film Honored

A Government committee has selected "Flavor of Maine," a film produced by BCF and sponsored by the Maine Sardine Council, for showing at international film festivals.

The new 16 mm., 14-minute color film, designed for all age groups, describes the Maine sardine industry--catching, processing, and methods of serving. Authentic recordings of ocean sounds and an original musical score contribute to its mood. It received honorable mention on October 7 at the 14th annual Film Festival in Columbus, Ohio.

The motion picture is the third in BCF's series on the Maine sardine industry; the first was produced in 1948.

"Flavor of Maine" now is available from BCF and its cooperating film libraries. Inquire: Audio-Visual Services, Bureau of Commercial Fisheries, 1815 No. Fort Myer Drive, Arlington, Va. 22209.

Boston Trawlers Improve Fish Handling Methods

A new system for handling fish at sea recently installed on five large trawlers operating out of Boston (Mass.) Fish Pier has proved a good investment. Devised by BCF, it includes an improved fish washer and hatch cover and is now standard equipment on all vessels of a Boston firm's fishing fleet.

The adoption of this equipment is one of the most important advances in handling fish aboard New England trawlers in many years.

An outstanding feature of the washer is its mechanical simplicity. Fish are conveyed through it by a flume originating from the deck hose. Since only a few fish are in the washer at any one time and need not be fork-

ed out, they reach the hold in much better condition than fish handled by more traditional methods. Vessels fitted with these washers are reported to get more fish out at top prices because the improved handling adds about a day to their shelf life. Another virtue of this washer is the exceptionally clean ice and bilges seen at the end of each trip. On deck, the strenuous job of forking the fish down is eliminated.

From Washer To Hold

From washer to hold after fish leave washer, they slide down dewatering chute and enter the hold through special hatch cover which contains a manhole and a fish hole. The fish hole has a flapper valve that allows fish to pass through but retards heat leakage into hold. The cover need never be removed at sea, so hold temperatures remain cooler--producing a significant saving in ice.

Note: For more information on systems for handling fish at sea, contact: Laboratory Director, BCF Technological Laboratory, Emerson Avenue, Gloucester, Mass. 01931.

Auke Bay Biologists Successfully Transplant Salmon

BCF biologists at Auke Bay, Alaska, report that the experiment to transplant fish to reestablish salmon runs in a barren stream has been successful. In late August 1964, BCF, Alaska Department of Fish and Game, and the salmon canning industry joined forces in an attempt to reestablish the even-year run of pink salmon in Sashin Creek, which had been virtually decimated; in 1962, only eight adult salmon were counted moving upstream to spawn. The biologists decided to try to improve the run by carrying live adult salmon from a stream with surplus and releasing them into Sashin Creek; 1,886 adult pink salmon were transferred from Bear Creek on Kuiu Island into Sashin Creek.

The transferred adult salmon lived through the transplantation and spawned normally. The eggs survived well through the winter of 1965-66 and produced 320,000 fry, which migrated to salt water. The payoff came this fall when 6,000 adults returned to Sashin Creek to spawn.

There are now over two million eggs in the gravel at Sashin Creek. Biologists are optimistic that this run will be reestablished, and that transplantations of this type may help restore similar badly depleted runs or establish new runs.

Cooked Salmon, Stored Then Warmed, Becomes Rancid Quickly

Fresh or iced salmon--when cooked and then stored at household refrigerator temperature (40° F.)--develops rancidity upon warming at a tremendous rate. This finding was made at BCF's Food Science Pioneer Research Laboratory in Seattle.

Salmon samples that experience this process are more oxidized, discolored, and rancid than salmon samples stored frozen for several years at 0° F. The researchers offer this tentative explanation of the phenomenon: the development of oxidation in iced fish, in which bacteria are growing, is arrested by the presence of the bacteria in a yet-unknown manner. The cooking of the fish arrests the action of bacteria and permits rapid oxidation at 40° F., which then is strongly accelerated by a reheating of the fish.

These observations are being followed up with work on other species. The same effect has been observed on rockfish, but here it is less pronounced because rockfish have a lower oil content than salmon.

Identify Cause of "MSX" Disease

Cooperating closely, scientists of BCF's Oxford (Md.) Biological Laboratory, Rutgers University, Hiram College, and Texas A & M have begun to unravel the enigma of the "MSX" disease that decimated oysters in Delaware and Chesapeake Bays. The disease is caused by a newly recognized protozoan, which was named Minchinia nelsoni by Haskin and Stauber of Rutgers and Mackin of Texas A & M. Couch, Farley, and Rosenfield of the Oxford Laboratory have identified the prespore and spore stages. Barrow and Taylor of Hiram College have demonstrated by flourescent antibody studies that the spores identified at Oxford are those of Minchinia nelsoni. To control a disease, knowledge of its cause

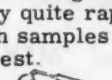
and the parasite's life cycle usually are essential. The university research was largely supported by BCF contracts.

Chinese A-Blasts Affect Oysters

Studies at BCF's Radiobiological Laboratory at Beaufort, N.C., have detected radioactivity in oysters caused by the Chinese nuclear explosions. The findings result from a program to study marine organisms that have accumulated radioactive materials. Several common marine invertebrate species in the Beaufort area serve as biological indicators for various types of radiation pollution.

Fallout radioactivity from Red China's second nuclear bomb test on May 26, 1965, was detected in the oyster, Crassostrea virginica. Prior to this blast, radioisotopes with relatively long active periods (about 1 year)--ruthenium 106, zinc 65, manganese 54, and potassium 40--were found in oyster tissue. Eleven days after the blast, additional radionuclides in the oysters included: cerium 141, ruthenium 103, zirconium 95-niobium 95, and barium 140-lanthanum 140.

These short-lived radioisotopes showed that increased radioactivity was due to fresh fallout. Lesser amounts of fresh fallout were detected in marine organisms after the first and third tests. Extremely sensitive detecting equipment measured the radioactivity, which was far below dangerous levels for man. Apparently, the organisms lose accumulated radioactivity quite rapidly: fresh fallout is detectable in samples for only a few weeks after each test.



Analyze King Crab Data

The length frequencies of male king crab caught during the trawl survey by the BCF's chartered vessel "Sonny Boy" in the Bering Sea have been completed. The catch was dominated by noncommercial size crab--less than 125 mm. carapace length. The most abundant group of commercial size crab occurred between 125 mm. and 140 mm. The researchers have nearly completed comparing the 1966 length frequencies with those collected from 1957 to 1961.

Combine Heat and Irradiation to Pasteurize Dungeness Crab Meat

The Seattle Technological Laboratory initiated a study of the feasibility of combining heat pasteurization and irradiation pasteurization to extend the refrigerated shelf life of high-quality, fresh, Dungeness crab meat. Previous tests indicated that Dungeness crab meat can be successfully heat-pasteurized by the process used in the blue crab industry.

The scientists hope that by combining low-dose irradiation (less than 0.2 megarad) and mild heat treatment (180° F.) storage life can be increased significantly--and without producing the adverse odor and flavor changes that accompany either higher irradiation doses or prolonged heat treatment above 180° F. In a 2-week test period, with storage at 34° F., two groups of samples were of good quality. However, the taste panel preferred the sample irradiated at 0.2 megarad followed by heat pasteurization.

Conduct Time-Temperature Studies of Salmonella in Fish Meal

The College Park and Pascagoula Technological Laboratories are cooperating in a time-temperature study to determine the process requirements for consistently producing a meal free of salmonella. The widespread incidence of salmonellosis and the incrimination of fish meal as a carrier of the causative organism inspired the study. Following various time-temperature treatments, the meals were submitted to College Park for nutritive value assessments.

Determinations of thermal destruction were made on several meals contaminated with a mixture of 5 salmonella strains. The heat treatment ranged from 150° F. for 60 minutes to 230° F. for a few minutes. Nutritive value determinations revealed that no significant damage was caused by the various heat treatments required to destroy all salmonella organisms.

Irradiate Mackerel to Study Vietnamese Food

Scientists of the Gloucester Technological Laboratory (Mass.) are using the Marine Products Development Irradiator (MPDI) to sterilize samples of fatty fish fillets (mackerel) for a Cornell University study. The study involves the manufacture of "Nuoc-Nam," a fermented fish condiment used a great deal by the Vietnamese. The condiment is made by a process of autolytic degradation of fish protein in strong brine; enzymes from the fish intestines cause the breakdown. The sterilized mackerel fillets will be used to study if and how "Nuoc-Nam" can be made for the Vietnamese.

Galveston Studies Distribution and Abundance of Shrimp Larvae

BCF's Biological Laboratory at Galveston, Tex., has begun a study to obtain estimates of the abundance of planktonic-stage Penaeus sp. and to determine their vertical distribution in relation to water temperature. Plankton collections are made in waters off Galveston ranging from 9 to 55 meters (5-30 fathoms) using a Clarke-Bumpus sampler. Four cruises have been completed and the examination of plankton samples begun.

Also, efforts were resumed to locate concentrations of Penaeus sp. postlarvae before they enter Galveston Bay. Simultaneous bottom-sled and plankton tows were made in one to 27 meters ($\frac{1}{2}$ to 15 fathoms). So far, only the sled tows have been examined. Results show that Penaeus sp. are abundant along the bottom inside 9 meters (5 fathoms). During August and September, both white and grooved (either brown or pink) shrimp postlarvae are present in these shallow waters.

Shrimp Cultivated in Artificial Ponds

At Galveston, too, about 4,000 postlarval white shrimp, spawned and reared to postlarvae under laboratory conditions, were stocked in one of the $\frac{1}{8}$-acre ponds in July. The shrimp were held over an 11-week period and no water was added or drained. Food was provided by fertilizing the pond prior to stocking, and twice thereafter, to induce the growth of plankton. Instead of a commercial fertilizer used in past experiments, chicken manure was applied to a single location within the pond. About one cubic yard of fertilizer was used in each application.

Shrimp grew at an average rate of 1.3 mm. and 0.1 g. per day. They attained a count size of 50 whole shrimp per pound over this 11-week period. During the first 5 weeks, however, they grew rapidly (2.3 mm. and 0.17 g. per day) then a marked decrease in growth was evident--apparently associated with decrease in plankton density, reflected in the chorimeter values. Additional fertilizer has been applied to the pond to restimulate plankton and shrimp growth.

Studies Life History of Pink Shrimp off Florida

The Galveston program of nighttime sampling of pelagic postlarvae Penaeus sp. (probably P. duorarum) shrimp entering Florida Bay continued during July-September. Semimonthly plankton samples were collected at the surface, middepth, and bottom of Whale Harbor Channel. From a low in February, the abundance of postlarvae increased gradually during the spring. There were peak catches in late May and in July, August, and September. Distribution of postlarvae in the water column was variable--apparently related to the incident light at each level. The highest percentages of postlarvae in the bottom nets were obtained near or during the full moon, and when the sky and water were exceptionally clear; conversely, the highest percentages of shrimp in the surface nets were associated with dark nights and/or turbid waters.

Daytime suction sampling of benthic postlarval and juvenile Penaeus (8-100 ml. total length) was continued in shallow water seagrass beds in Florida Bay. A comparison of May-August samples for 1965 and 1966 showed that the average catch per square meter ($m.^2$) in 1965 was 1.1 shrimp, compared with 1.6 in 1966.

Exploratory shallow-water shrimp samples were taken in Florida Bay and along the Florida Keys from Key Largo to Big Pine Key. A pushnet and pullnet were used to obtain samples. Young shrimp were particularly

abundant (10 shrimp per $m.^2$) at sites to the west (Sandy Key) and southwest (Key Vaca). Shrimp were scarce (2 or less per $m.^2$) from Key Largo to Lower Matecumbe Key. In eastern Florida Bay, density was also low. These observations indicate that postlarval recruitment and/or survival increases toward western and southwestern Florida Bay.

Method Found to Peel Pink Shrimp

After considerable research, the Technological Laboratory at Ketchikan, Alaska, has developed a satisfactory method to peel pink shrimp--thus overcoming a primary obstacle to the commercial production of a high-quality product. The whole shrimp are heated at 165° F. for 15 seconds to set the pink color, then heated at 110° F. for 3 minutes to loosen the shell for easy removal by a mechanical peeler. Based on the success of this process, a private firm is installing a pilot plant in Wrangell, Alaska. BCF will cooperate in semicommercial-scale trials.

Lake Trout Thrive on Alewives

A recently completed experiment by the BCF Biological Laboratory at Ann Arbor (Mich.) showed that 5 pounds of alewives eaten by 2-year-old lake trout resulted in an increase of 1 pound in trout biomass. The trout grew rapidly on a diet of alewives. Their body weight increased by 36 percent in 5 weeks. A control group of lake trout, which was fed a standard hatchery diet, experienced a weight increase of 26 percent during the same period. Conversion efficiency was low during the first week while the trout were adapting to the new diet; however, it increased during the second week and stabilized at about 19.5 percent. This corresponds to a conversion ratio of about 5:1.

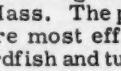
Tagged Seal Pups Weigh Less Than Untagged

A 10-year series of pups weights has shown that tagged pups weigh significantly less than untagged pups a week after tagging, reports BCF's regional office in Seattle. In 1966, the researchers found that mere handling of pups also produces weight differences. Several hundred pups, marked by shearing a small patch of fur from the top of the head, furnished a small reservoir of "handled" pups. A week after shearing, "handled" pups weighed less than "unhandled" (unsheared) pups. Handling and subsequent weight loss (or failure to gain) may lessen the individual's chances of survival at sea.

Sealskin Prices Are Down

The prices of sealskins at the semiannual auction of the Fouke Fur Company, October 13-14, in Greenville, S. C., were down from the record high sale in April 1966. About 21,000 Alaska fur sealskins were offered for sale for the account of the U. S. Government. Prices for skins that were dressed, dyed, machined, and finished (DDM&F) declined about 15-20 percent; Lakoda prices dropped about 20-25 percent.

Average prices per skin, and percent change from the April 1966 sale (in parentheses), were: Blacks $117.51 (-19.4%); Mataras $96.18 (-18.3%); Kitovis $95.76 (-15.3%); Lakoda naturals $81.06 (-21.4%); Lakoda Browns $48.19 (-14.2%); Lakoda Blacks $45.17 (-29.3%).



Workshop Discusses Swordfish and Tuna Longlining

BCF and industry members talked about swordfish and tuna longlining at a workshop in Gloucester, Mass. The participants agreed that longlines are most efficient for catching subsurface swordfish and tuna, and that the U.S. market for these species is virtually unlimited.

They noted some factors hindering the fishery's expansion: loss of gear, lack of suitable refrigerated vessels for preserving tuna catch, and lack of suitable electronic equipment for locating lost longline gear. The participants believed these adverse factors eventually will be overcome.

Lends Gear for Winter Hake Fishery

Again this year, BCF's Seattle Base is lending depth telemetry gear to vessel owners who have markets for the winter hake fishery in Puget Sound. Last year, this fishery produced about 6 million pounds. Some vessels already have the gear and started fishing.

Also, the captain of the commercial trawler "Radio" has offered the use of his vessel for experimental fishing for herring with a BCF-owned midwater anchovy trawl. The Seattle Base will provide gear and personnel to implement the study.

Keel Laid for BCF Exploratory Vessel

On November 3, the keel was laid for the exploratory fishing research vessel "Delaware II," at the South Portland Engineering Co., Maine. The vessel will be commissioned in late 1967.

The 155-foot, 1,000 hp. Delaware II will replace the Gloucester-based Delaware as BCF's primary vessel for fisheries exploration and gear research in the western North Atlantic north of Cape Hatteras. The vessel, of stern trawler design, also will be used to demonstrate commercial stern trawling techniques to an industry largely founded on side trawling.

The Delaware now in service is a familiar sight along the northeast coast. The 148-foot side trawler was built for commercial service in Maine in 1937, saw extensive naval service in World War II, and was used by the German fishing industry in the years right after the war. Since 1949, it has been used in BCF's fishery technological and exploratory fishing offshore research programs.

Dr. J. L. McHugh Named BCF Acting Deputy Director

Dr. J. L. McHugh, who has been Assistant Director for Biological Research since joining BCF in 1959, has been named Acting Deputy Director. He succeeds Harold E. Crowther, the newly designated Acting Director.

For 8 years before coming to BCF, Dr. McHugh was Director of the Virginia Fisheries Laboratory and Professor of Marine Biology at the College of William and Mary, Williamsburg, Va.

Dr. J. L. McHugh

He was born in Vancouver, B. C., and received his bachelor's and master's degrees from the University of British Columbia. He served the Biological Staff of Canada's Fisheries Research Board from 1938 until 1941. During World War II, he was an infantry officer with the Canadian Army in England and France.

After earning his doctor of philosophy degree at the University of California's Scripps Institution of Oceanography, Dr. McHugh moved to Virginia to head the State's marine behavior program at Gloucester Point. He became a United States citizen in 1958.

He is the author of 70 publications on fishery biology, ichthyology, and biological oceanography, a member of scientific societies, and a trustee of the International Oceanographic Foundation. He has been a member of many United States delegations to international fishery meetings in Europe, Latin America, and the Far East.

FEDERAL ACTIONS

Department of the Interior

FISHERIES LOAN FUND HAS PROVIDED NEARLY $22 MILLION

From the inception of the Federal Fisheries Loan Fund in 1956, through September 30, 1966, the Fund's Administrator, BCF, received 1,864 applications for $48,298,257. By September 30, 1966, 977 applications ($21,773,930) had been approved, 587 ($13,674,137) declined or found ineligible, 275 ($9,355,902) had been withdrawn by applicants before processing, and 25 ($1,422,386) were pending. Of those approved, 353 were for amounts less than applied for; the total reduction was $2,071,902.

Recent Applications

The following applied recently for loans:

Olaf M. Johnson, Rural Route 2, Oconto, Wis. 54153, for construction of a used 52.3-foot, registered length, vessel to fish for alewives.

Adolf G. Olofson, 1516 Tongass Ave., Ketchikan, Alaska 99901, to buy a used 38-foot wood vessel to fish for salmon, halibut, crab, and shrimp.

Fred Schneider, 12809 Kalnor Ave., Norwalk, Calif. 90650, to construct a new 63-foot steel vessel to fish for albacore, yellowfin and skipjack tuna, swordfish, groupers, squid, anchovies, and bonito.

Seven Seas, Inc., Box 1243, Ponce, Puerto Rico 00712, to build a 153-foot, overall length, steel vessel to fish for tuna.

Robert A. and Billie S. Thackwell, 1417 Brookhill Dr., Fort Myers, Fla. 33901, to buy a used 55.1-foot, registered length, wood vessel to fish for shrimp.

Sylvester J. Chieslak, Box 24, Cohoe, Alaska 99570, to buy a used 32-foot vessel to fish for salmon, halibut, and crab.

Donald F. and Cecilia W. Kiesel, 1214 Donna Drive, Fort Myers, Fla. 33901, to buy a new 80-foot steel vessel to fish for all commercial species of shrimp.

Cecil E. Prior, Loudville, Maine 04564, to build a new 32-foot wood vessel to fish for lobsters.

Notices of the applications were published in the Federal Register, October 28, 1966.

* * * * *

FISHING VESSEL MORTGAGE INSURANCE PROGRAM

Since the mortgage insurance program began on July 5, 1960, BCF, the program's administrator, received 139 applications for $16,267,107. Of the total, 102 applications were approved for $7,212,421, and 18 applications for $6,017,812 were pending on September 30, 1966.

During the third quarter of 1966, BCF received 17 applications for $5,888,862.

* * * * *

FISHING VESSEL CONSTRUCTION DIFFERENTIAL SUBSIDY

From the first applications for a differential subsidy under BCF's expanded program received in December 1964, through September 30, 1966, BCF received 75 applications for an estimated $17,398,500 in subsidies. Public hearings were held on 54 applications; 49 applications for subsidies estimated at $12,322,000 were approved; 9 subsidy contracts totaling $1,464,351 were carried out.

* * * * *

SUBSIDIES HELP BUILD STERN TRAWLERS

On November 4, the Department of the Interior announced that federal funds totaling $5.2 million will help build two stern trawler factoryships--the largest fishing vessels to operate from U. S. ports. The subsidy covers half the construction cost of $10.5 million.

Contracts under the 1964 Fishing Fleet Improvement Act were signed November 2, 1966, by BCF and American Stern Trawlers, Inc., of New York City, the owners. Maryland Shipbuilding and Drydock Co., Baltimore, Md., will construct the trawlers.

Gridiron Length

The identical trawlers, about 292 feet, will be almost the length of a football field, and about a third longer than the 195-foot "Frosty Morn," the longest U. S. fishing vessel. The latter was built in 1958 and fishes for menhaden in the Gulf of Mexico.

The new vessels will be the first of their type to be built or operated in the United States and will be equipped to catch, freeze, package fish fillets from such species as cod and haddock, and produce fish meal and oil. One vessel will operate in the Northwest Atlantic; the other in the North Pacific.

The subsidy law provides assistance to build modern fishing vessels that meet certain requirements. The Federal contribution equals the cost difference between building vessels in U. S. and less expensive foreign shipyards; the maximum subsidy is 50 percent of the domestic cost. Public hearings are held before any subsidies are awarded.

Including the latest contracts, 11 vessels have been subsidized. Three have been completed.

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FIRST ANADROMOUS
FISH FUNDS AWARDED

Interior Department has allocated $750,000 to 5 States, the first funds under the Anadromous Fish Act of 1965. The Act seeks to conserve and develop the species that go from sea up rivers to spawn--salmon, shad, etc. The Act also covers Great Lakes fishes that spawn in tributary streams.

The Federal funds are for fiscal 1967, which began July 1, 1966, and may be used to finance up to 50 percent of approved projects. Michigan received $210,000; Washington, $202,500; Maine, $130,000; Oregon, $120,000; California, $95,000. The money will help pay for 13 projects in research, stream improvement, and construction of fishways, spawning channels, and hatcheries.

About $2 million is available in fiscal 1967 on a matching basis to 31 States bordering the oceans or Great Lakes. The Act authorizes up to $25 million through June 30, 1970. No State may receive more than $1 million a year.

The Anadromous Fish Act is administered jointly by BCF and the Bureau of Sport Fisheries and Wildlife. Together, they form Interior's Fish and Wildlife Service.

* * * * *

SETS NEW PERMIT OBLIGATION
FOR SEISMIC WORK

Geological Survey now requires that companies receiving permits to carry out seismic work must notify the appropriate BCF Regional Director of the time and place of this work. It also requires the companies to pay the cost of having one observer acceptable to BCF on board during the seismic work if BCF thinks it necessary.

Department of Commerce

LOANS $30.5 MILLION
TO FISHERIES IN 1965

The Small Business Administration (SBA) of the Commerce Department loaned $30.5 million to 919 fishery firms in 1965. Recipients were firms or persons engaged in commercial fishing, operators of oyster farms, hatcheries and fish preserves, tongers and dredgers of oysters, and gatherers of sponges, seaweed, etc.

SBA also aided processors, such as canners of fish, shrimp, oysters, and clams--and those engaged in smoking, salting, drying, freezing, and packaging fresh fish products.

Distributors included wholesalers of fresh and cured fishery products and retailers of all fishery products. Some truckers of fish received loans, but they are not included in the 1965 figures.

* * * * *

AIDS CONSTRUCTION OF
CALIFORNIA MOORING BASIN

The Economic Development Administration has approved a $560,000 grant to help build a $1,360,000 mooring basin in Noyo, northern California; the State of California is loaning $800,000. The basin will enable the commercial fishing industry to expand.

Noyo Harbor, at the edge of the city of Fort Bragg, is the only improved harbor for about 175 miles of coastline from Bodega Bay to

Eureka. The loan and grant will permit dredging operations in Noyo River Channel and construction of a mooring basin at the river's mouth. The expanded facilities will increase the resident commercial fishing fleet from 175 to 225 boats. The number of Noyo-based trawlers also is expected to increase when the mooring basin is completed in about 18 months.

* * * * *

PLANS EXPANSION OF FOREIGN TRADE REPORTS

Plans to expand and rearrange the series of statistical reports on U. S. foreign trade beginning in 1967 were announced October 17, 1966, by the Department of Commerce's Bureau of the Census. The plan results from discussions with users of the statistics.

The new series will contain for the first time more detailed information, particularly about transportation; much information will be reported more promptly; and more summary-type data will be made available.

The Census Bureau expects that a new monthly report will be widely use, called "Highlights of U. S. Export and Import Trade," it will contain 80 pages of interrelating statistical tables identifying important movements in the trade by commodity, country, United States custom region and district, and method of transportation. The report will be scheduled for release within 30 days after the month's end.

Detailed information on the expanded and changing program is presented in a new brochure, "Guide to Foreign Trade Statistics." Since most current monthly reports will be changed, some reports discontinued, and new reports begun, users of foreign trade statistics may wish to study the "Guide" in order to decide which series will best meet their needs in 1967. Copies are available free from Bureau of the Census, Washington, D. C. 20233, or from field offices of U. S. Department of Commerce in major cities.

* * * * *

ITS SURVEY OF CANNED FOODS TO INCLUDE FISH

The Bureau of the Census is planning an annual survey of inventories covering distributors' stocks of specified canned foods, including fish, as of December 31, 1966. Together with previous surveys, this type of survey would provide the only continuing source of information on stocks of specified canned foods held by wholesalers--and in warehouses of multiunit retail organizations.

Reports will be obtained from scientifically selected sample of wholesalers and multiunit retail organizations handling canned foods. These reports will provide year-end inventories of canned food items with measurable reliability. Also, a number of multiunit firms will be asked for information about firms maintaining canned food stocks that are not reporting now in the Canned Food Survey.

Copies of the proposed forms and a description of collection methods are available from the Director, U. S. Bureau of the Census, Washington, D. C. 20233.

* * * * *

VESSEL OWNERS TO BE ASKED FOR MORE INFORMATION

The Bureau of Customs is revising customs forms 1258 and 1259 to permit proper identification of vessel owners and to facilitate converting "Merchant Vessels of the United States" to automatic data processing. In connection with this necessary revision, the Bureau published a notice in the Federal Register, November 2, 1966.

The Bureau will request vessel owners to furnish their zip code and Internal Revenue Service employer number, or social security number. It advises that customs forms 1258 and 1259 will be revised. Marine documents will have to show the owner's Internal Revenue Service employer number, or social security number.

Pending revision, customs form 1258 shall be amended by inserting "Zip Code, and Internal Revenue Employer No. or Social Security No." following "Name and Address of Owner." Customs form 1259 shall be amended by inserting "and Internal Revenue Service Employer No." after "Full Corporate Name of Corporation," and "Zip Code" following "Business Address of Corporation."

The Bureau of Customs will mail customs form 1283 to all owners of record. This form requests the additional information needed. It also requests confirmation of address and vessels owned.

FEATURES

HARD-CLAM EXPLORATIONS OFF SOUTHEASTERN UNITED STATES

By Robert Cummins, Jr.*

Hard clams are distributed from New England along the Atlantic coast to Florida and into the Gulf of Mexico. They long have been the basis of a commercial fishery in New England and along the middle Atlantic States. BCF explorations have resulted in the development of a small, offshore, hard-clam fishery which has expanded production in North Carolina. This article gives the latest statistics on the total fishery, exploratory dredging results from North Carolina to Florida, and a description of the new North Carolina fishery.

Hard clams (Mercenaria mercenaria and M. campechiensis) constitute an important fishery resource of the Eastern United States (table 1). They occur in waters of every Atlantic state from Maine to Florida and into the Gulf of Mexico; however, most hard-clam production occurs in southern New England and the Middle Atlantic States (table 2). Little or no commercial production has been recorded from the Florida east coast, Georgia, South Carolina, Pennsylvania, or New Hampshire. Intermittent fisheries have occurred along the Florida west coast[1] and in southern Maine.

Table 1 - Annual United States Production of Hard-Clam Meats, 1949-63[1]

Year	Quantity[2]
1949	18,856
1950	21,049
1951	20,801
1952	17,573
1953	16,976
1954	13,519
1955	14,385
1956	14,693
1957	14,767
1958	14,280
1959	13,553
1960	14,877
1961	14,604
1962	13,295
1963	14,529
1964	14,925

1/Data taken from Fisheries Statistics of the United States.
2/Thousands of pounds.

Published catch statistics date back to 1879 for New England and 1880 for the Middle and South Atlantic States. More recently, Tiller, Glude, and Stringer (1952) gave a comprehensive report of the Atlantic Coast fishery from 1931 to 1948. Since 1949, New England and the Middle Atlantic States have continued as the major hard-clam producing areas of the eastern United States. During this period little change has taken place in capturing gear, marketing structure, or processing procedures. General refinements in the fishery, however, have resulted from recent developments in sanitation, pollution abatement, culture of seed clams, and the production of canned products such as chowder.

Prior to 1959, little was known of the abundance or availability of hard clams offshore south of the Middle Atlantic States. "Offshore" is the open ocean, in water deeper than 2 or 3 fathoms, outside the existing inshore fishery. As part of a resource assessment program, BCF began clam dredging in 1959 with the chartered exploratory fishing vessel Silver Bay to determine the commercial potential of hard-clam stocks from North Carolina to Florida. This report summarizes the results.

HARD CLAM EXPLORATIONS

During 7 cruises, from November 1959 to March 1961, the Silver Bay dredged at 271 stations. The explorations were made along the coast from north of Cape Hatteras to south of Cape Kennedy, Fla. (fig. 1). Most drags were confined to the 4- to 8-fathom depth range. Preliminary results were summarized in reports of the Silver Bay cruises (BCF, 1960a, 1960b, 1960c, 1960d, 1961a, 1961b, and 1961c) and by Cummins, Rivers, Struhsaker (1962).

*Chief, Exploratory Fishing and Gear Research Station, BCF, St. Simons Island, Georgia.
1/Carpenter, James S. (MS), History of Scallop and Clam Explorations in the Gulf of Mexico.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 776

Table 2 - Atlantic Coast Hard-Clam Production and Value by States, 1949-64

States	Quantity of Hard-Clam Meats Produced in:																	
	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Total 1949-64	Average 1949-64
	(Thousands of Pounds)																	
Maine	590	503	569	424	335	292	250	288	360	253	160	64	13	1	2	2	4,106	256.6
Mass	1,797	2,014	2,173	1,845	2,070	1,236	1,059	1,302	2,025	1,820	1,619	1,401	1,664	1,319	1,474	1,440	26,258	1,641.1
R. I.	2,135	2,225	3,054	3,248	4,774	4,498	5,020	4,251	3,905	3,246	2,737	3,210	2,608	2,140	2,224	1,827	51,102	3,193.9
Conn.	13	10	49	38	42	18	138	76	224	471	360	370	420	262	287	331	3,109	194.3
Sub-total	4,535	4,752	5,845	5,555	7,221	6,044	6,467	5,917	6,514	5,790	4,876	5,045	4,705	3,722	3,987	3,600	84,575	5,285.9
N. Y.	7,294	7,721	7,072	5,520	4,050	2,452	2,657	3,575	3,582	3,737	3,407	3,888	4,291	4,836	5,311	5,402	74,795	4,674.7
N. J.	4,045	5,085	4,372	3,626	3,341	3,019	3,119	2,885	2,355	2,580	2,011	2,552	1,687	1,340	1,584	1,894	45,495	2,843.4
Del.	249	808	912	501	450	481	444	804	505	322	343	484	582	378	262	418	7,943	496.6
Sub-total	11,588	13,614	12,356	9,647	7,841	5,952	6,220	7,264	6,442	6,639	5,761	6,924	6,560	6,554	7,157	7,714	128,233	8,014.6
Md.	236	192	216	162	130	96	58	124	373	275	243	172	457	383	489	332	3,938	246.1
Va.	1,497	1,378	1,267	1,128	873	729	887	796	725	711	1,690	1,661	1,861	1,690	2,096	2,453	21,442	1,340.1
Sub-total	1,733	1,570	1,483	1,290	1,003	825	945	920	1,098	986	1,933	1,833	2,318	2,073	2,585	2,785	25,380	1,586.2
N. C.	-	836	835	725	445	244	122	148	243	278	340	432	490	247	332	255	5,972	373.3
S. C.	-	7	18	8	12	9	2	2	13	120	111	97	109	59	73	146	786	49.1
Ga.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	0.1
Fla. 1/	-	1	8	1	10	5	6	2/	-	1	2	2	4	3	1	1	45	2.8
Sub-total	-	844	861	734	467	258	130	150	256	401	453	531	603	309	406	402	6,805	425.3
Total	17,856	20,780	20,545	17,226	16,532	13,079	13,762	14,251	14,310	13,816	13,023	14,333	14,186	12,658	14,135	14,501	244,993	15,312.0

States	Value of Hard-Clam Meats Produced in:																	
	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Total 1949-64	Average 1949-64
	(Thousands of Dollars)																	
Maine	98	94	186	126	107	100	74	89	175	149	90	41	7	1	2	2	1,341	83.8
Mass.	586	644	802	725	755	465	378	454	743	680	756	721	952	741	1,039	1,012	11,453	715.8
R. I.	469	651	992	1,119	1,712	1,709	1,918	1,736	1,649	1,475	1,434	1,407	992	943	1,295	956	20,457	1,278.6
Conn.	6	4	16	11	12	5	44	23	61	166	108	121	176	94	126	138	1,111	69.4
Sub-total	1,159	1,393	1,996	1,981	2,586	2,279	2,414	2,302	2,628	2,470	2,388	2,290	2,127	1,779	2,462	2,108	34,362	2,147.6
N. Y.	2,441	2,809	2,518	2,759	2,025	1,269	1,520	1,975	1,948	1,869	2,099	2,392	2,493	2,926	3,581	4,136	38,760	2,422.5
N. J.	1,450	1,824	1,661	1,414	1,745	1,490	1,249	1,980	824	896	692	900	732	536	635	820	17,848	1,115.5
Del.	76	273	312	112	253	240	154	255	156	104	126	192	232	146	106	185	2,922	182.6
Sub-total	3,967	4,906	4,491	4,285	4,023	2,999	2,923	3,210	2,928	2,869	2,917	3,484	3,457	3,608	4,322	5,141	59,530	3,720.6
Md.	94	96	108	97	72	53	22	39	174	100	106	74	217	178	265	172	1,867	116.7
Va.	641	689	626	674	484	389	489	441	434	426	832	756	865	812	1,012	1,219	10,789	674.3
Sub-total	735	785	734	771	556	442	511	480	608	526	938	830	1,082	990	1,277	1,391	12,656	791.0
N. C.	-	157	192	167	116	72	35	52	98	111	136	173	196	99	130	98	1,832	114.5
S. C.	-	2	7	3	3	2	2/	2/	4	40	37	32	38	20	25	54	267	16.7
Ga.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	0.1
Fla. 1/	-	2/	4	2/	5	2	1	2/	-	2/	2/	2/	2	1	2/	2/	15	0.9
Sub-total	-	159	203	170	124	76	36	52	102	152	173	205	236	120	155	152	2,115	132.2
Total	5,861	7,243	7,424	7,207	7,289	5,796	5,884	6,044	6,266	6,017	6,416	6,809	6,902	6,497	8,216	7,778	108,663	6,791.4

1/East Coast.
2/Less than 500 pounds or $500.00.

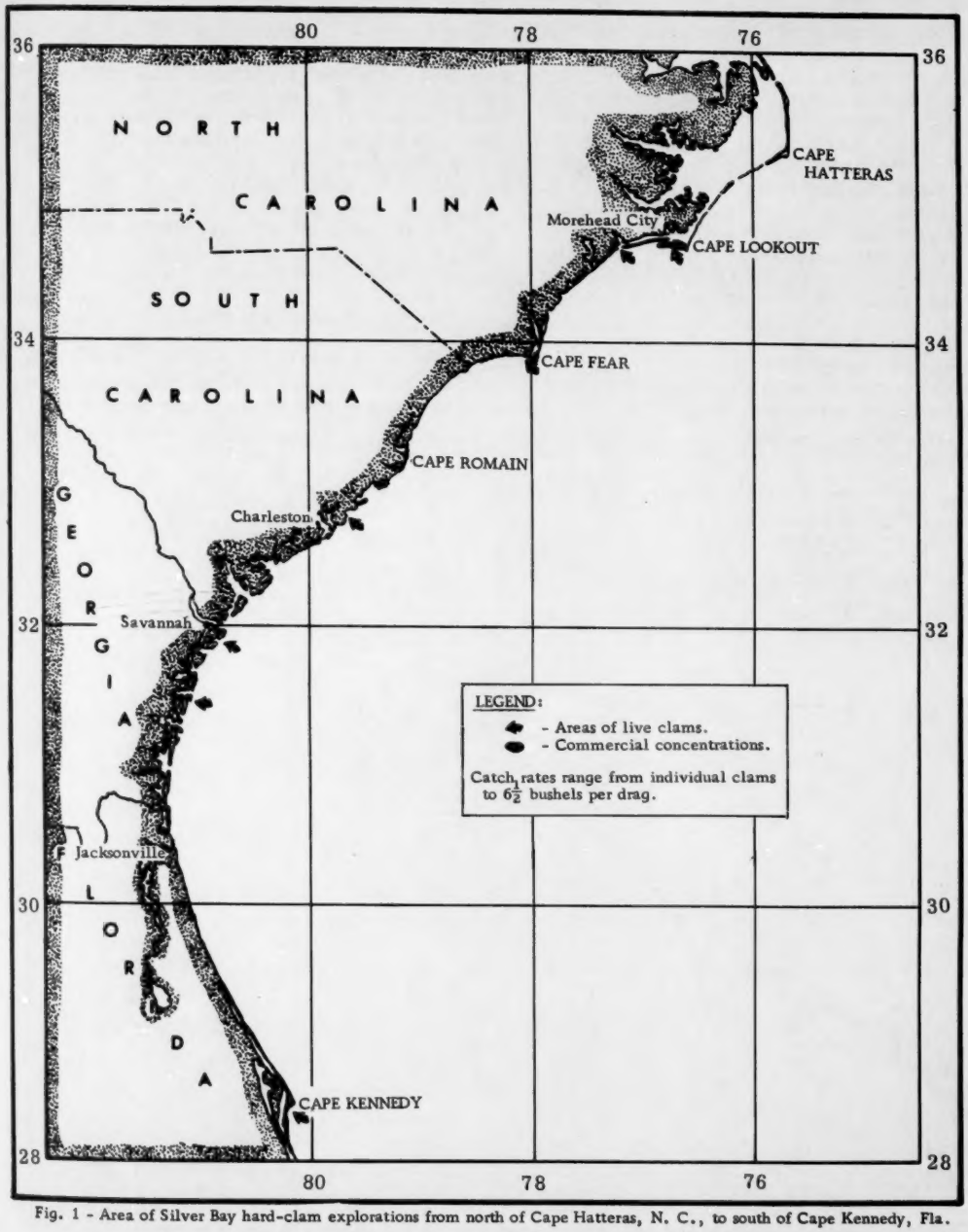

Fig. 1 - Area of Silver Bay hard-clam explorations from north of Cape Hatteras, N. C., to south of Cape Kennedy, Fla.

Area Surveyed

The northern portion of the area surveyed (fig. 2) extends from the Outer Banks at Cape Hatteras, the easternmost part of the work area, to Cape Romain, north of Charleston, S. C. It is interrupted by Capes Lookout and Fear in North Carolina and Cape Romain in South Carolina, which form three large bays--Raleigh, Onslow, and Long.

South Carolina, Georgia, and northern Florida (fig. 3), which lie westernmost and the greatest distance from the Gulf Stream, constitute the middle portion of the survey area.

Southward from the mouth of the St. Johns River near Jacksonville to Eau Gallie (fig. 4), the southernmost portion surveyed, the coast is interrupted only by Cape Kennedy.

Gear and Methods

To obtain coverage throughout the work area, whenever the opportunity occurred, clam dredges were used during regularly scheduled exploratory fishing cruises. These were modified 14-tooth Fall River type clam dredges (see Tiller, Glude, and Stringer, 1952). A single dredge was normally towed for 15 to 30 minutes off an aft gallows of the Silver Bay with $\frac{7}{8}$- or $\frac{3}{4}$-inch wire rope. Two major difficulties affected catch rates--the vessel could not be slowed to optimum dredging speeds, and its draft restricted fishing to depths shallower than about 3 fathoms. The gear appeared to perform satisfactorily on soft mud and sand bottom, but the Fall River type dredge tends to become clogged in clay or sticky mud bottom. On hard bottom, the dredge tends to skip or jump, and for this reason an accumulator

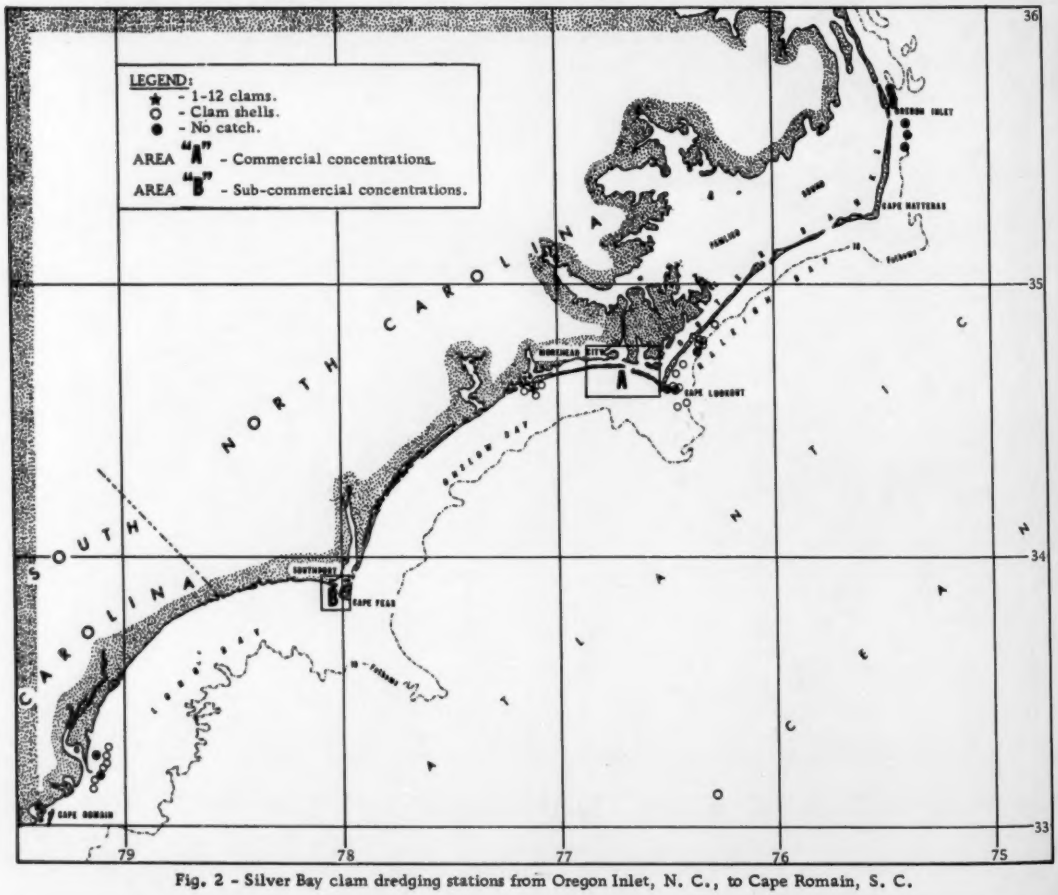

Fig. 2 - Silver Bay clam dredging stations from Oregon Inlet, N. C., to Cape Romain, S. C.

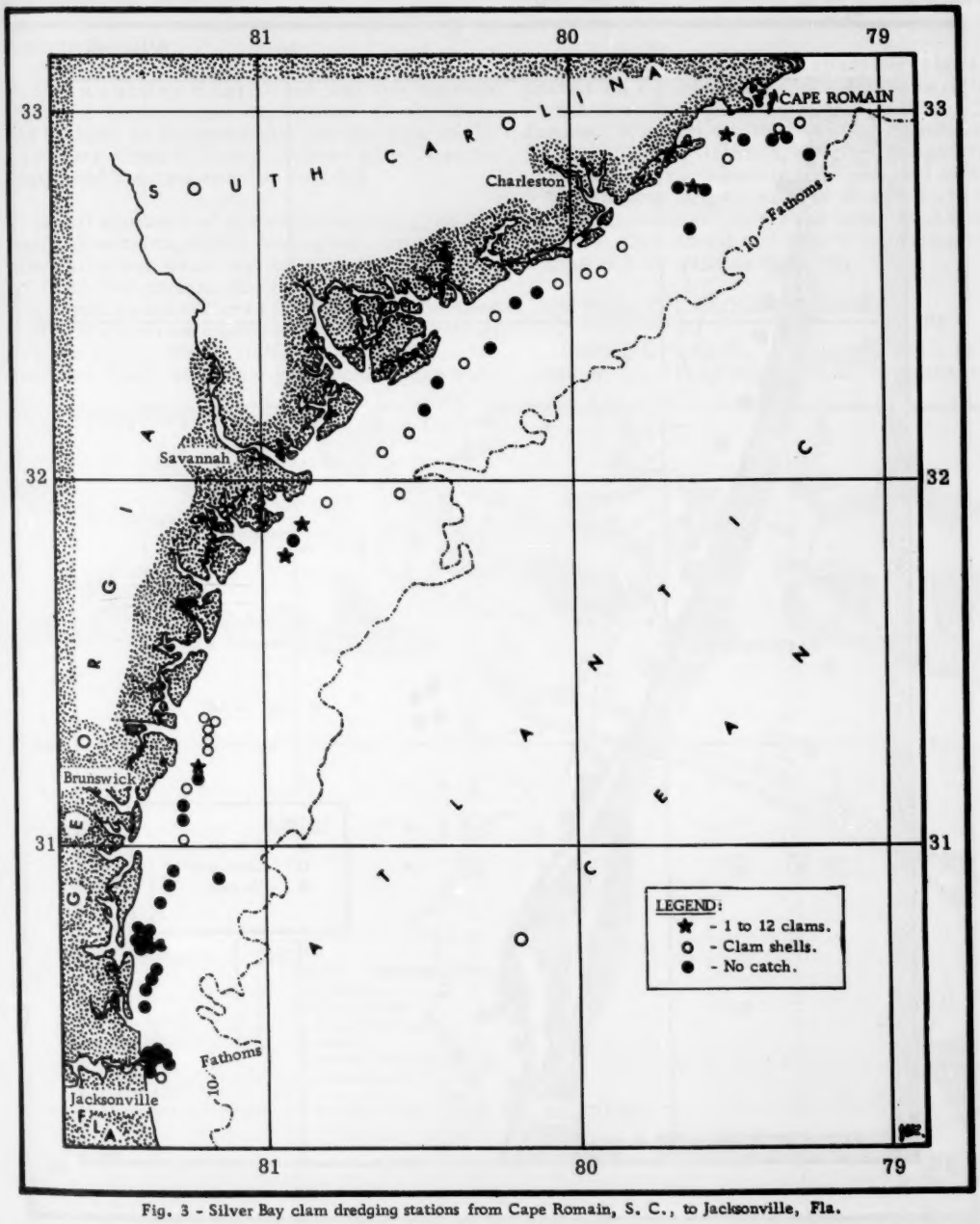

Fig. 3 - Silver Bay clam dredging stations from Cape Romain, S. C., to Jacksonville, Fla.

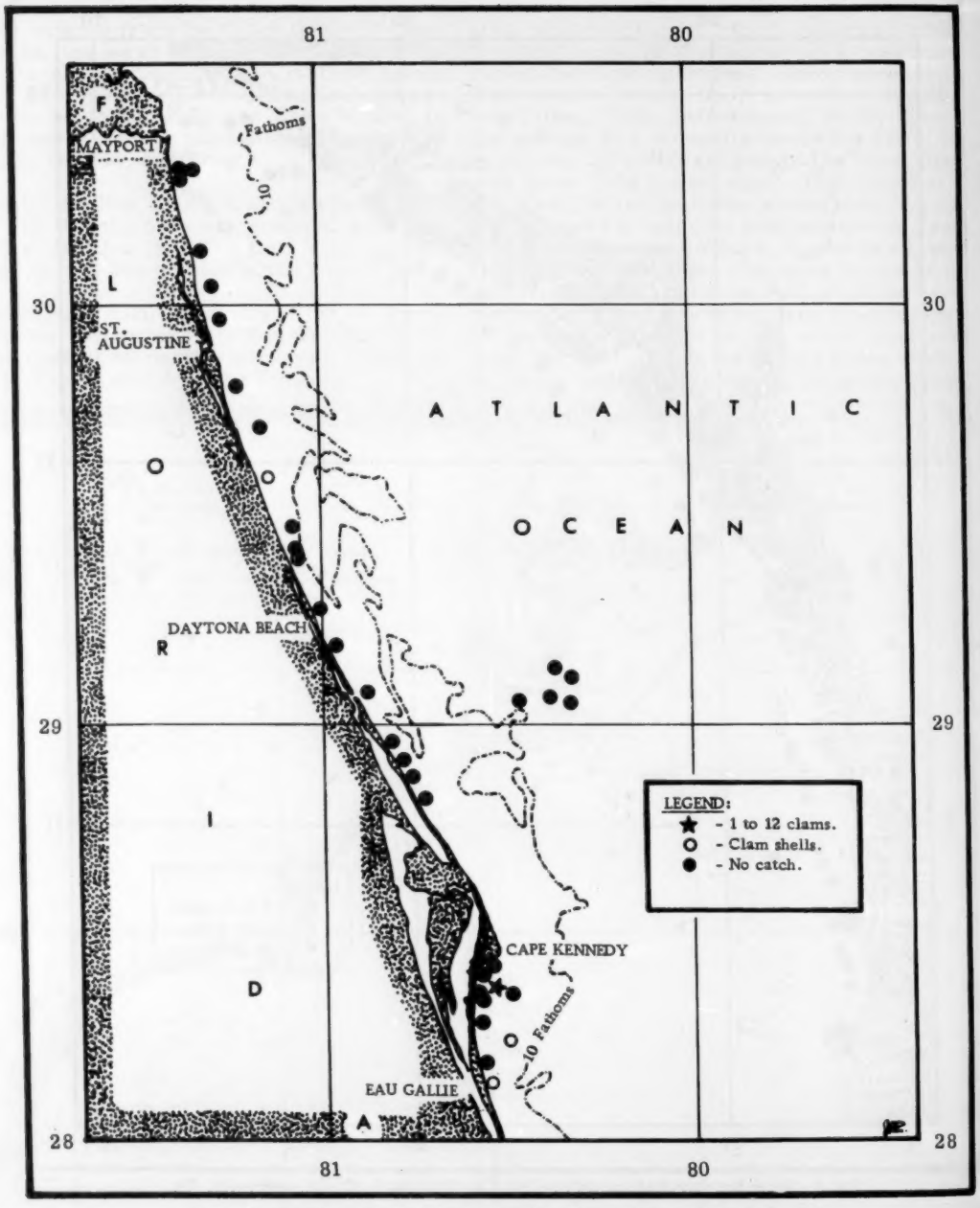

Fig. 4 - Silver Bay clam dredging stations from Mayport, Fla., to Eau Gallie, Fla.

chain (Captiva, 1960) was added; this partially alleviated the problem.

Fishing Results

The southern hard clam was the species captured during these explorations. The taste and texture of its meat are comparable to the northern hard clam. Porter and Chestnut compared the two species in 1962.

Small numbers of ocean quahog (Arctica islandica) were captured during two cruises, but with different gear and only in deeper water (20 to 25 fathoms) north of Oregon Inlet. Their ecological range differed from that of the hard clam. We have not captured this clam south of Oregon Inlet. Cape Hatteras is reported the southern limit of its geographical range (Abbott, 1954). It is a common commercial species north of the survey area and Arcisz and Sandholzer described it in 1947.

Cummins, Rivers, and Struhsaker (1962) reported on commercial concentrations of hard clams found in an area extending from Cape Lookout Bight to 4 miles west of Beaufort Inlet (fig. 5). In this area, catches ranged from one clam to $6\frac{1}{2}$ bushels (585 pounds) of 3- to 5-inch clams per 40-minute drag. Catches from an area near Cape Fear consisted mostly of hard-clam shells and up to 77 individual live clams per 30-minute drag (fig. 6).

THE NORTH CAROLINA FISHERY

During Cruise No. 20 (November 21 to December 13, 1959) commercial concentrations

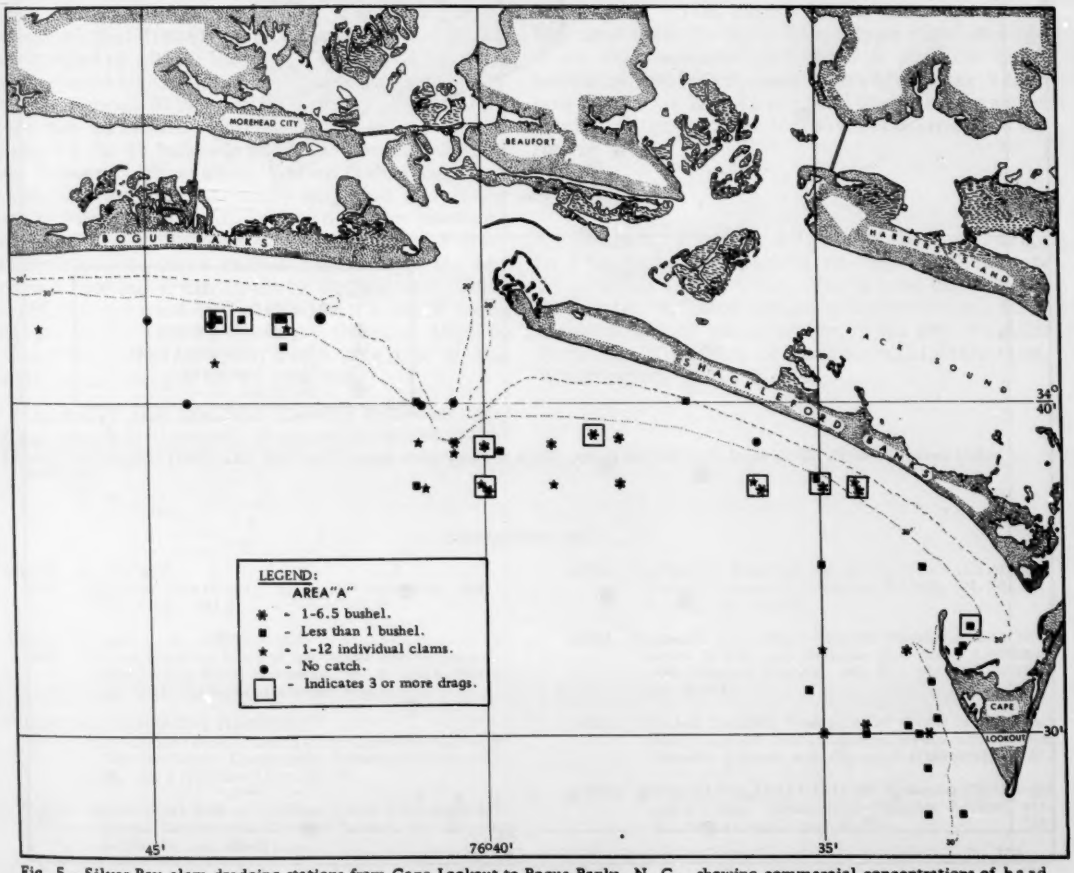

Fig. 5 - Silver Bay clam dredging stations from Cape Lookout to Bogue Banks, N. C., showing commercial concentrations of hard clams.

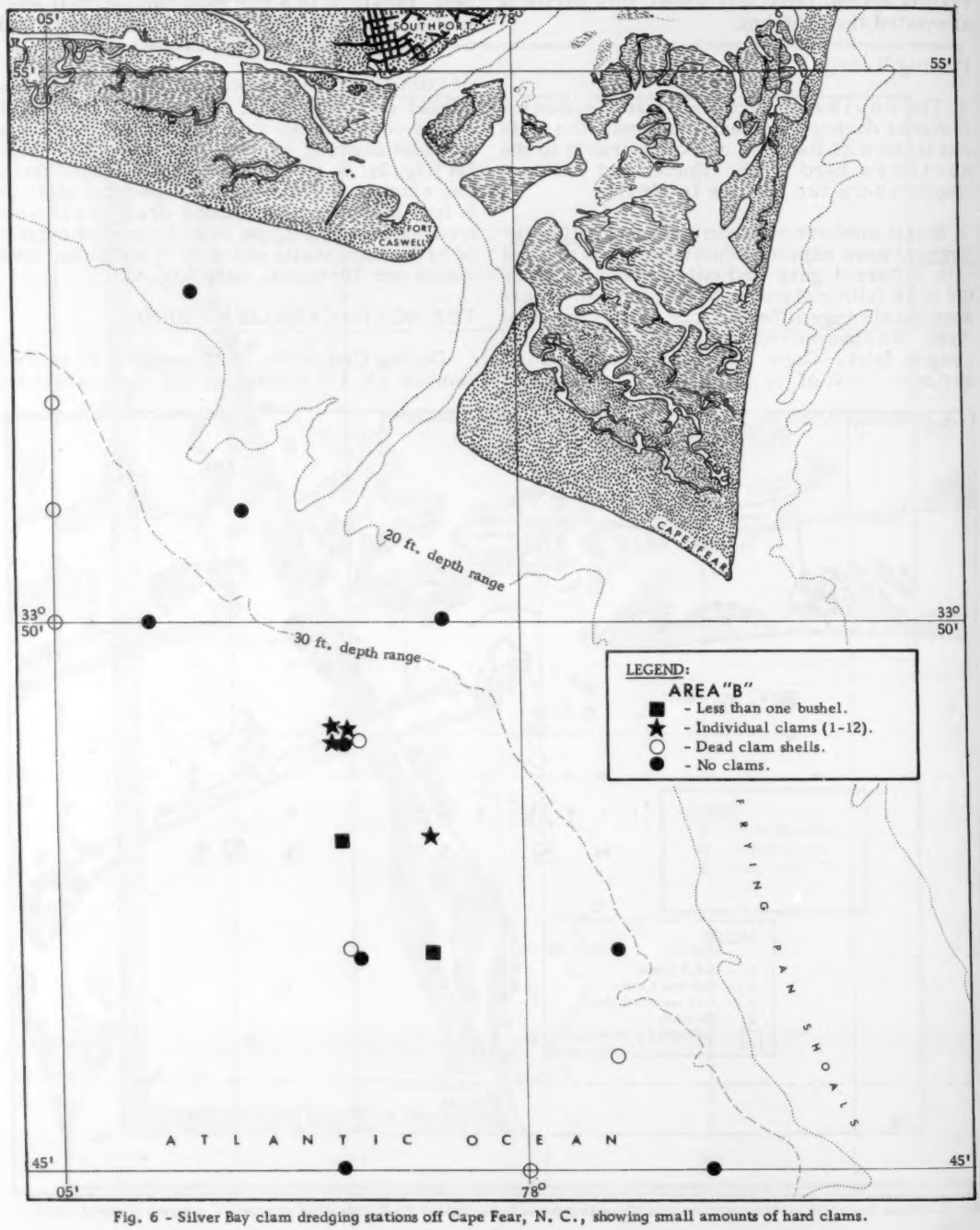

Fig. 6 - Silver Bay clam dredging stations off Cape Fear, N. C., showing small amounts of hard clams.

of hard clams were found in Onslow Bay--from Cape Lookout to 4 miles west of Beaufort Inlet, in the 4- to 6-fathom depth (fig. 5). In this area, the Silver Bay caught 4,200 pounds (47 bushels) of hard clams during simulated commercial fishing with a modified 14-tooth Fall River clam dredge (Captiva, 1960) in 388 minutes of fishing. The catch was landed and sent to a local processing plant, where the clams were processed with satisfactory results. Interested fishermen were given information on gear costs, sources of supply, gear rigging, and handling techniques. Local shrimp vessels were readily and inexpensively converted to the dredging operation. Thus, with Bureau technical assistance, a small winter fishery developed in 1959 (Porter and Chestnut, 1960).

Catch rates were not determined, but they can be estimated. Porter and Chestnut (1962) reported that fishermen were paid about $2.25 per bushel in 1960. Based on personal contact and reports from fishermen, the boats usually grossed about $100 to $125 per day.[2/] Therefore, the estimated average production varied from 44 to 55 bushels of clams per day during the winter "off season," when fishermen and vessels were not normally engaged in fishing operations. Chestnut (personal communication) reported that some vessels worked sporadically and others rather regularly. He reported too that from January to March 1960, 1,155,000 pounds of clams in the shell were caught by 12 vessels; from October 1960 to June 1961, 2,242,000 pounds of clams in the shell were caught by 15 vessels.

Although the limited fishery depends upon local market demand, it is nonetheless valuable because it provided fishermen with another source of income during poor shrimping seasons or during winter months. Hard clams do not appear to be a transitory resource for they have been available since their discovery in commercial quantities in 1959.

Throughout the remainder of the area surveyed, not enough hard clams were found for commercial harvesting. Most catches consisted only of shells or few live clams; however, these catches suggest that hard clams live in or adjacent to most of the area surveyed, possibly in waters shallower than 3 fathoms. The Silver Bay could not explore effectively there. In the tidal marsh zone adjacent to much of the area surveyed, it is not uncommon for individuals to dig hard clams for personal consumption, though they are not usually sold commercially. For these reasons, hard-clam explorations with the Silver Bay and with the Fall River type clam dredge were discontinued in 1961. A shallow-draft vessel suitable for clam searching over various types of bottom--and the use of new or modified dredging gear--are recommended for future work.

APPENDIX

Table 3, Fishing Log--M/V Silver Bay. . . is attached as appendix to reprint (Separate No. 776) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D. C. 20240.

2/Porter and Chestnut (1962) also report an average daily catch of 4,831 pounds for 239 boat days--@ $2.25 per 90 pound bushel = $120.75.

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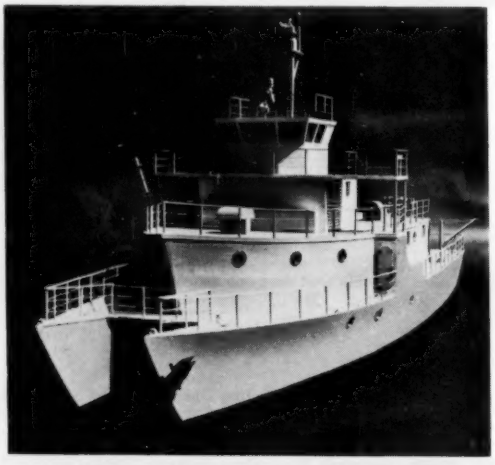
ALUMINUM CATAMARAN PLANNED FOR OCEAN STUDY



An artist's conception of the large twin-hulled aluminun catamaran, presently under construction, to be used for oceanographic research by Johns Hopkins University.

The largest aluminium-hulled catamaran (a 106-foot long, twin-hulled vessel) in the United States is being constructed at a Baltimore shipyard. The construction was made possible by a National Science Foundation design-and-construction grant of more than $1.5 million. The experimental craft will contain the most modern navigational and oceanographic equipment. The vessel's streamlined, twin-hull design is expected to provide lateral stability and speed never before possible on oceanographic surveys. The 11-foot wide well between the two hulls will provide a sheltered area for ocean-probing instruments suspended from the main deck.

The catamaran will be used for oceanographic research by the Johns Hopkins University. Dr. Donald Pritchard, professor of oceanography and director of the Johns Hopkins Chesapeake Bay Institute said, "Hydrographic research can be extended further on the Atlantic continental shelf and operations within the Chesapeake Bay will be less dependent on the weather." (Reprinted, with permission from Science News, weekly summary of current science, copyright 1966 by Science Service, Inc.)

TRENDS IN GULF OF MEXICO SHRIMP TRAWLING FLEET

By Rolf Juhl*

The design of Gulf of Mexico shrimp trawlers has kept step with the expanding shrimp fishery. From small, shallow-draft, single-rig vessels, operating in a predominantly inshore fishery, design changes have produced larger and more versatile double-rigged vessels that can fish offshore in depths of 50 fathoms and greater. The present-day shrimp vessel design evolved from the Florida single-rig trawler, which had the house forward and working deck aft. The double-rig trawling method was initiated during 1955 and soon gained acceptance throughout the Gulf of Mexico.

Shrimp trawling in the Gulf has developed in the last 3 decades from an inshore, estuarine, bay fishery in shallow water to the present fishery on the broad shelf areas in depths of 50 fathoms or more (Anderson, 1948).

The design of shrimp-trawling vessels has evolved as the fishery extended into new shrimp grounds. Shallow-draft vessels suitable for sounds and bays were the mainstay of the fishery before 1945 (Springer, 1951). Typical boat designs of the northern central Gulf areas favored the house aft with the working deck forward. A single shrimp trawl was towed from warps leading from the winch, mounted athwartships on the forward deck, through blocks mounted on the port and starboard aftercorners of the house. During this same period, however, the shrimp vessels in the eastern and western Gulf favored a vessel design and deck arrangement similar to the Greek sponge boats (Ringhaver, 1959); on these, the house was located forward and the working deck aft. The winch was installed just aft of the house, and the net was towed from double warps rove through two blocks mounted on one outrigger boom. During the fishing operation, the towing warps were held in position directly over the stern by a deck chain and boom hook arrangement. With minor modification, this deck arrangement gained popularity among offshore shrimp-vessel operators throughout the southeastern United States. It was the first step towards double-rig trawling.

In 1955, Texas shrimp fishermen first attempted to develop the double-rig methods in the Gulf of Mexico (Knake, Murdock, and Catching, 1959). These efforts evoked widespread industry interest, and many individuals contributed to further development in the following 10 years. The popularity of double-rig fishing led to the conversion of many conventional shrimp vessels. It has so strongly influenced deck and gear arrangement that almost all new vessels are double-rigged.

Although the double-rig method has reached a fairly advanced stage of development, it is still changing. A recent innovation was the introduction of stabilizer planes suspended from the midpoint of the outriggers

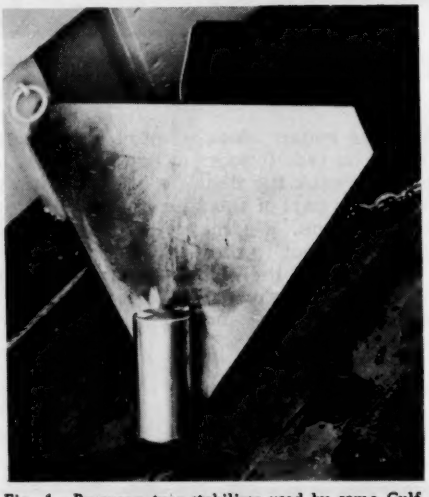


Fig. 1 - Paravane-type stabilizer used by some Gulf shrimp vessels. Shown is stainless steel model; most are galvanized steel.

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U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 777

during fishing operations--and while the vessel is anchored on fishing grounds. The stabilizers help considerably to dampen the roll of the vessel. One major shrimp boatyard includes stabilizers as standard equipment in all new construction (fig. 1). Normally, the stabilizers are suspended from blocks mounted about two-thirds out on the outrigger booms; occasionally, the stabilizers are suspended from the extremities of the booms (fig. 2). This technique is used in the deepwater (down to 200 fathoms) royal-red shrimp fishery, in which a single trawl is fished from a separate gallows frame.

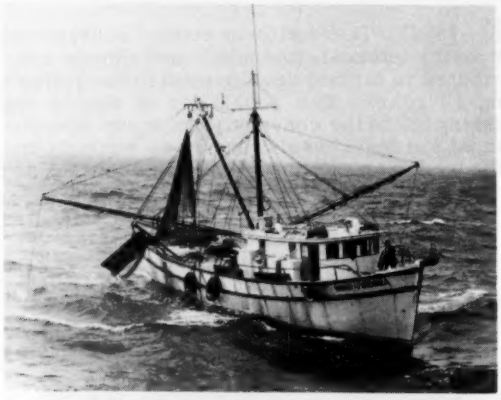

Fig. 2 - Stabilizers suspended from the outriggers' extremities of shrimp vessel fishing a single trawl in deep water.
(Photo: J. B. Rivers)

Another recent development is the use of tag lines on trawl doors. The tag line, long enough to reach the deck, is permanently tied to the upper part of the doors. A pole is used to recover line. Formerly, a crew member had to catwalk out to the end of the outriggers and tie a line to the door's chain for subsequent hauling aboard. This practice was always dangerous, and expecially so during heavy seas.

Main trawl winches have increased in size and ruggedness to allow for greater versatility in faster setting and haulback of gear and greater cable capacity for fishing in deeper waters. Also, they provide for use of larger diameter cable, which reduces breakage, lasts longer, and improves safety.

The following graphs and table provide information about the shrimp vessels over 5 gross tons that operated in the Gulf during 1963 and 1964. They are compiled from published (Lyles, 1965) and unpublished U. S. statistical data. A 10 percent, random sample of the vessel list was used in computing the data. Similar statistics on vessel characteristics are not readily available for the years before 1963.

The characteristics of the Gulf fleet are fairly similar for the 2 years (table); however, the average number of crew members per vessel for 1964 on the double-rigged vessels decreased 0.14. This decrease implies that 5 percent, or 100 vessels of this fleet of over 2,000, employs one man less. Similarly, but to lesser degree, the single-rig trawl data also show reduction in manpower. Increase of single-rig vessels in 1964 over 1963 (table) may indicate conversion of smaller double riggers to single rigs, or entry of vessels from other activities into the shrimp fishery.

Many new vessels, 65 to 75 feet long, are shrimping in international waters off the northeast coast of South America, and elsewhere. The migration to these grounds is indicated in figure 3, which shows fewer vessels in the higher gross-ton category. It also shows that most double-rigged vessels are in the 30- to 49-gross ton class, which coincides with the 50- to 59-foot length groups shown in figure 4. The gross ton-length relation, however, is not well defined for the smallest and largest vessels (figs. 3 and 4). Figure 5 shows the relative size of the nets (footrope measurement) used by double- and single-rig vessels. Footrope measurement of the two nets used by the double riggers have been combined. The lower graph indicates a decrease in size of nets on double-rig vessels for 1964 in the 84- to 90-foot range, and a slight increase in the nets with groundropes

Average Measurements and Characteristics of Shrimp Trawlers Operating in the Gulf of Mexico During 1963 and 1964

	1963					1964					
	Total Vessels	Gross Tonnage	LOA	Men in Crew	Size of Net[1]	Total Vessels	Gross Tonnage	LOA	Men in Crew	Size of Net	Main Engine Power[2]
	No.	Tons	Feet	No.	Feet	No.	Tons	Feet	No.	Feet	Horsepower
Double Rig	2,051	37.2	53.6	2.85	43.5	2,059	39.3	55.2	2.71	44.5	197
Single Rig	646	17.4	45.3	2.12	57.0	723	18.4	45.4	2.06	55.5	145

1/Net size measurement is length of leadline.
2/HP data not available for 1963.

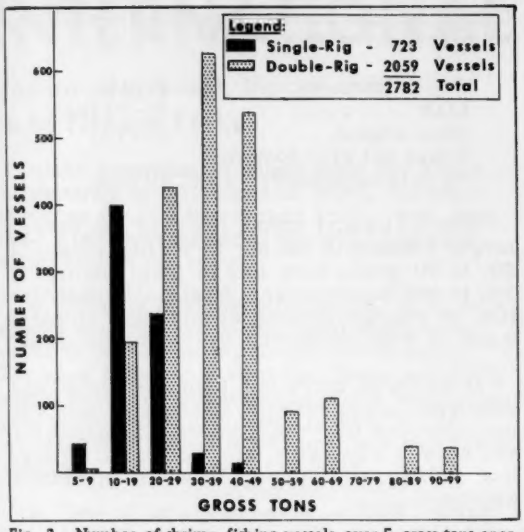

Fig. 3 - Number of shrimp-fishing vessels over 5-gross tons operating in the Gulf of Mexico (U. S. A.) during 1964, single- and double-rig.

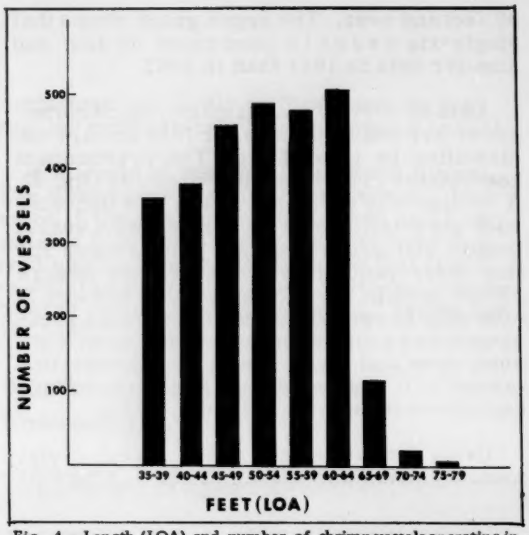

Fig. 4 - Length (LOA) and number of shrimp vessels operating in the Gulf of Mexico during 1964. Total vessels: 2,782.

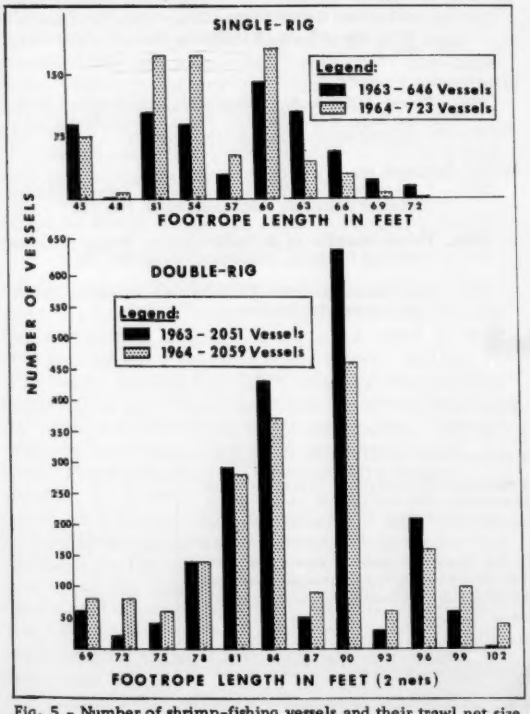

Fig. 5 - Number of shrimp-fishing vessels and their trawl net size, operating in the Gulf during 1963 and 1964, single- and double-rig shown separately.

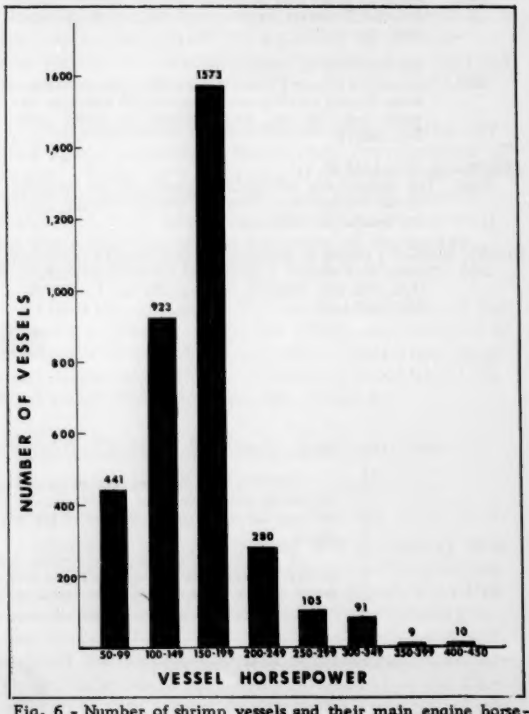

Fig. 6 - Number of shrimp vessels and their main engine horsepower, operating in the Gulf of Mexico during 1964--single- and double-rig combined.

99 feet and over. The upper graph shows that single-rig vessels used more 60-foot and smaller nets in 1964 than in 1963.

Data on shrimp vessel main-engine horsepower are available only for 1964 and are not classified by type of rig. The predominant horsepower preference is 150 to 199 (fig. 6). A comparison of figures 3, 4, and 6 indicates poor correlation between horsepower, vessel length, and gross tonnage. The reason for this discrepancy may be that vessel owners prefer certain model engines that are available only in specific horsepower. This preference may account for the fact that many vessels, over and under typical characteristics (shown in opposite column), are overpowered and others underpowered (Juhl, 1961).

Using data showing certain vessel modal measurements and characteristics, a typical Gulf of Mexico double-rig shrimp vessel may be described as follows:

Gross tonnage	42-45
LOA	55-60 feet
Main engine.	200 hp.
Trawl net size footrope	
2 nets combined	90 feet

The present trend, however, is toward larger vessels in the 65- to 75-foot class, of 60- to 80-gross tons, and to main engines of 275 to 300 horsepower. Steel-hull construction is rapidly gaining acceptance, although wood is still preferred by most boatyards.

In addition, there is a trend to design and construct larger vessels, 80 feet and over, for multipurpose use--as offshore oil rig tenders and survey platforms, and for fish trawling, line fishing, and shrimp trawling in distant waters.

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Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.

INTERNATIONAL

Japan and South Korea Hold Fishery Talks

After returning to Japan from the 3-day Conference of Ministers in Seoul, Republic of Korea (ROK), September 8-10, 1966, Japanese Fisheries Agency Director Hisamune summarized the talks:

• Exports of fishery products: ROK delegates sought to increase South Korean exports to Japan, but Agriculture-Forestry Minister Matsuno stated that Japan naturally would have to limit imports which would compete with domestic fishery products. He wished South Korea would promote exports of noncompetitive fishery products.

• Use of Japanese ports by ROK fishing vessels: The South Korean Government did not understand the details of Japan's decision to restrict entry into its ports of ROK fishing vessels. Many ROK officials held the erroneous impression that Japan's action suppressed the principle of freedom of the high seas. Public opinion in South Korea trended toward this view. Director Hisamune explained that Japan was only following the lead of other countries with coastal fisheries and was not discriminating against South Korea. To maintain order in its fisheries, Japan acted to keep its ports from becoming bases for foreign fishing vessels.

• Exports of fishing vessels to South Korea: Under the Japan-ROK Fisheries Agreement, exports of fishing vessels were to be transacted on a commercial credit basis. However, during the first year of the aid program, this principle was not followed because no commercial loans were extended. Vessel exports were handled on a nonrepayment basis (reparations). Director Hisamune stated: 1) from a practical standpoint, exports of fishing vessels under 20 gross tons to small-scale coastal fishery operators are difficult to finance on a commercial-credit basis, so the nonrepayment (reparations) fund can be used for this purpose; 2) of the total $300 million commercial loan, the $40 million earmarked for medium and small fisheries should be used to buy 20- to 100-ton vessels for offshore fishery, and ROK should guarantee repayment; 3) the $50 million commercial loans for large fishing companies will likely be processed through regular commercial channels (export banks).

• Imports of seaweed from South Korea: The Korean cabinet members were all interested in the seaweed problem, and again requested that Japan expand her seaweed import quota. They strongly urged that trade negotiations for the current business year be started early. ("Suisan Tsushin," September 13, 1966.)

Northwest Pacific Fisheries Convention

JAPAN TO RENEGOTIATE TREATY WITH USSR

Japanese fishery circles are concerned with the problems of renegotiating the Japanese-Soviet Fisheries Treaty. The Soviet Union has already made clear that it wants the treaty extended for another 10 years--and wants the salmon catch of the two nations closer to equal.

The Japanese Government and fishing circles favor extending the treaty for another 10 years. They are studying the effect that the entry of South Korea into the North Pacific fisheries may have on negotiations--as well as the question of the closure of Japanese ports to foreign fishing vessels.

The real issue is the 50-50 division of the salmon catch between the USSR and Japan. If accepted, it would drastically reduce the Japanese high-seas fleet. (Fishery Attaché, U. S. Embassy, Tokyo, Sept. 20, 1966.)

North Pacific Fishery Convention

JAPANESE OFFICIAL DISCUSSES ITS RENEGOTIATION WITH CANADA AND U. S.

Minister of Agriculture and Forestry Matsuno and the Fisheries Agency's Production Division Chief Kamenaga discussed with the Canadian Government problems relating to the North Pacific Fisheries. Both men attended the Japan-Canada Ministerial Conference, October 3-6. They sounded out the Canadian Government concerning renegotiation of the Treaty and hoped to break the impasse in negotiations.

Kamenaga went on to Washington, D. C., after the Conference to discuss this matter with U. S. officials. In addition, he discussed on a preliminary basis the renegotiation of the 2-year Japan-United States king crab agreement which expires this year. ("Nihon Suisan Shimbun," Sept. 23, 1966.)

Fish Meal

WORLD PRODUCTION JANUARY-AUGUST 1966 IS 11% ABOVE 1965 PERIOD

World fish meal production in the first 8 months of 1966 was up about 11 percent from the same period of 1965. Output in 1966 rose sharply in Chile and Norway. Peru also increased production. But output was down substantially in the United States.

Most of the principal countries producing fish meal submit data monthly to the International Association of Fish Meal Manufacturers (see table).

World Fish Meal Production, Jan.-Aug. 1966

Country	Aug. 1966	Aug. 1965	Jan.-Aug. 1966	Jan.-Aug. 1965
	(Metric Tons)			
Canada	10,834	9,193	57,375	53,252
Denmark	14,005	14,475	74,830	79,921
France	1,100	1,100	8,800	8,800
German Fed. Repub.	7,096	6,706	48,854	44,867
Netherlands	1/	488	2/1,510	3,863
Spain	1/	1/	1/	3/13,247
Sweden	878	408	2,948	4,890
United Kingdom	6,526	6,406	60,556	54,567
United States	24,647	38,162	120,099	169,642
Angola	1/	2,818	4/ 27,843	26,561
Iceland	23,771	17,505	100,221	85,194
Norway	49,873	43,056	327,500	232,845
Peru	246	369	969,643	893,022
So. Afr. (including S.-W. Afr.)	27,420	17,271	5/234,549	250,093
Belgium	375	375	3,000	3,000
Chile	17,975	3,703	171,122	50,845
Morocco	6,500	1,650	16,700	9,550
Total	191,246	163,685	2,225,550	1,984,159

1/Data not available.
2/Data available only for January-April 1966.
3/Data available only for January-May 1965.
4/Data available only for January-July 1966.
5/Revised.
Note: At present, Japan does not report fish meal production to the International Association of Fish Meal Manufacturers.

OECD

FISHERIES COMMITTEE MEETS

The Fisheries Committee of the Organization for Economic Cooperation and Development (OECD) held its 15th meeting in Paris, Sept. 28-30, 1966. The Committee discussed its continuing work on an economic study of fisheries development in the North Atlantic. It instructed the OECD Secretariat to confine the study to the economic factors involved in rational exploitation of the fishery resources of the North Atlantic, and to coordinate the project with similar studies under consideration by other international organizations.

In other actions, the Committee reviewed reports on services rendered the fishing industry and continued its study of national fisheries polices.

The next meeting was set for December 5-7, 1966.

Oceanography

3 NATIONS CONDUCT RESEARCH

A joint fishery oceanography expedition of 5 research vessels, organized by the USSR, Norway, and United Kingdom, left Murmansk on September 5, 1966, for the Barents Sea. The 2,000-mile cruise of several months will include the northeastern Norwegian Sea. Two Soviet vessels are participating: The brand-new "Nansen," and the "Akademik Knipovich," one of the largest oceanographic vessels in the world. The British are supplying one research vessel and the Norwegians two.

The Soviet part of the research is coordinated by the Polar Institute of Fisheries and Oceanography (PINRO) of Murmansk, headed by Dr. Arkadii P. Alekseev. The Norwegian part will be conducted by the Bergen Fisheries Research Institute, headed by Dr. Gunnar Rollefsen. The distribution of young cod herring, ocean perch, and other species will be studied. At the end of the cruises, scientific data will be compared and analyzed in a joint meeting at Bergen. Research in the Barents Sea is needed because heavy fishing has greatly depleted cod stocks there. Soviet landings of Polar cod in 1965 were reportedly 60 percent below previous years.

This joint research again confirms the good relations in fisheries between the Norwegian and Soviet Governments. British participation probably resulted from contacts during the 1965 visit of a parliamentary fishery delegation to the USSR. The Soviets gave considerable publicity to the joint expedition.

World Network Provides Weather Information to Mariners

The skipper of a small craft running close to shore can get timely and accurate weather forecasts and warnings from commercial radio stations. But the skipper of an ocean-going vessel needs more refined and specialized weather services. Through its Marine Weather Service, the Weather Bureau of the Commerce Department's Environmental Science Services Administration (ESSA) offers this vital information to all mariners.

Before radio communication, a mariner had to keep a sharp eye on the barometer and study the wind, sea, and clouds to tell what sort of weather he was running into, or what was overtaking him. Near the coast and in port, visual weather warnings--flags by day and lights by night--were of some help.

Until this century, the lack of data from oceanic areas confined weather advices to descriptions of conditions over coastal and inland waters. In 1905, the first radio weather report received by the Weather Bureau from a ship at sea opened a new era in marine forecasts and warnings. It soon became apparent that reports from many different areas could produce a fairly good picture of oceanic weather systems and their movements.

Shortly thereafter, the meteorological services of all maritime nations were cooperating in a plan to collect reports from ships and issue advices of storms at sea. Concurrently, an internationally understood numerical code was devised for transmitting ships' weather messages. These plans were promoted by the International (now World) Meteorological Organization and are still in use today.

Fig. 1 - The Coast Guard cutter "Pontchartrain" battles rough weather on Ocean Station Baker. (Photo: U. S. Coast Guard)

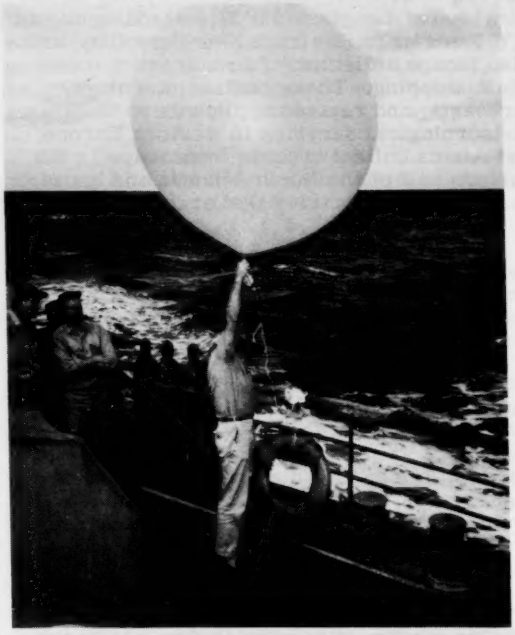

Fig. 2 - Weather balloon launched from ships to gather information on upper air. Weather reports from many ships are used to prepare forecasts for aviation and marine interest. (Photo: ESSA)

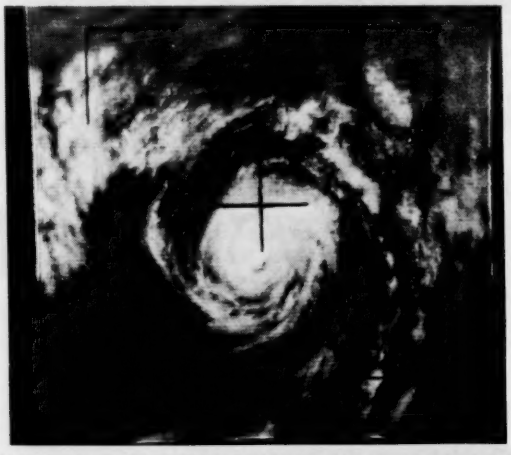

Fig. 3 - A weather satellite photographed Hurricane Emily threatening shipping off Mexico's West Coast in September 1965. Satellite pictures of weather over the oceans have improved forecasts and warnings prepared for mariners. (Photo: ESSA)

How North Atlantic Is Covered

The North Atlantic Ocean area can serve as an example of this system. The Weather Bureau collects reports from shipping in waters west of Longitude 35° W. (extending about 1,700 nautical miles from New York City) and also issues bulletins for broadcast to merchant shipping. These contain warnings, forecasts, and reports applicable to the area. Meteorological services in western Europe and Africa collect reports from ships in the eastern half of the North Atlantic and broadcast bulletins covering that area.

More recently, U. S. weather satellites such as ESSA 1, 2, and 3 have provided pictures of weather systems from every part of the earth--from Indian Ocean typhoons to Saint Lawrence Seaway ice conditions.

If a captain wants a "weather picture" of his area, a coded weather map analysis--a "canned map"--is available from broadcast bulletins. Using the coded information, he can draw his own map showing locations of Highs, Lows, frontal systems, etc., to determine whether he will meet favorable or adverse weather and sea conditions.

Weather information from ocean areas is also important to airline pilots. To serve the growing stream of oceanic flights that began during World War II, an international network of ocean-going weather ships was established. Twelve ships now are at assigned stations in the North Atlantic and North Pacific Oceans. The United States maintains 6 vessels; in addition to regular Coast Guard crews, they carry specially trained Weather Bureau technicians to make surface and upper air reports on daily schedules.

These floating weather stations, which stay within a 10-mile square for about 25 days, collect oceanographic data, provide navigational aids to ships and aircraft, and perform search and rescue duties when required.

Reports by these ships, merchant vessels, coastal and island stations--and satellite photographs of global weather systems--complete U. S. weather coverage for the high seas.

8-Million-Boat Armada

There are an estimated 8 million boats of all types operating in U. S. coastal waters, lakes, and inland waterways.

But the shrimp trawler plying the Gulf Stream, the hydroplane in Washington's Puget Sound, the ore-carrying barge on the Great Lakes, and the yacht off California will only put out from shore "weather and seas permitting."

To improve weather services to marine interests--particularly pleasure boating in harbor and coastal areas along the Atlantic and Gulf coasts--Weather Bureau-operated VHF radio stations soon will provide continuous weather warnings, forecasts, and reports to mariners. The stations are part of a planned nationwide network. Already, the broadcasts operate in the New York City area and the Chicago area of Lake Michigan.

ESSA's Environmental Data Service is a data bank for information on average temperatures, precipitation, cloudiness, etc. Weather summaries and climatological tables are available for U. S. and foreign waters; atlases and pilot charts for offshore cruising and transoceanic travel; and climatological summaries for individual states aid boaters.

FOREIGN

CANADA

LANDINGS ARE DOWN BUT VALUE UP SLIGHTLY

Landings during the first 6 months of 1966 totaled 808.2 million pounds (valued at C$52.2 million) compared with 834.2 million pounds (valued at C$51.2 million) during the same period of 1965, reports the Monthly Review of Canadian Fisheries Statistics, June 1966.

Landings and ex-vessel values of principal species were:

Species	Jan.-June			
	1966	1965	1966	1965
	Landings		Value	
	(1,000 Lbs.)		(1,000 C$)	
Atlantic Coast:				
Cod	219,877	208,093	9,764	8,273
Haddock	65,085	51,892	4,648	3,399
Pollock	18,353	26,346	723	925
Flounder and sole	88,874	75,356	3,016	2,505
Herring	108,066	93,025	1,500	1,178
Swordfish	627	1,346	378	613
Lobsters	20,127	23,489	11,754	14,789
Scallops	7,527	6,751	2,906	3,845
Pacific Coast:				
Halibut	14,929	15,619	5,145	4,747
Herring	137,517	221,205	2,299	2,904
Salmon	7,510	5,384	3,290	2,487

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CONSIDERS LIMITING SALMON FLEET SIZE

Canadian Government and fishermen's representatives met in Vancouver, September 26, to discuss tentative proposals to license vessels for the salmon fishery.

Because the Government is concerned about the increased fishing for salmon, its Federal Department of Fisheries has suggested for consideration proposals to keep fleet in the salmon fishery at present level.

The Vancouver meeting produced no agreement on steps to reduce the catching power of salmon fleet; no decision was made on a restrictive vessel licensing policy. However, the Canadian Fisheries Minister warned that no assurance could be given that a license would be issued for a vessel to engage in the salmon fishery in 1967 unless the applicant had a vessel licensed for salmon in 1966--or unless arrangements to acquire the vessel, for which a license was sought, had been completed prior to the Minister's announcement. Special consideration would be given to salmon fishermen who did not fish in 1966 for some valid reason.

The Government plans to hold another meeting with industry on this subject before the end of 1966. (Canadian Department of Fisheries, Ottawa, Oct. 5, 1966.)

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HERRING FISHERMEN ASK HIGHER EX-VESSEL PRICES

British Columbia herring fishermen have asked C$20.48 a ton for herring in 1966/67 contract negotiations with processors. That would be an increase of C$3.08 over the 1965/66 price of C$17.40 a ton. (The Fishermen, Vancouver, Sept. 23, 1966.)

Note: Ex-vessel prices for herring in British Columbia are not comparable to prices in certain other countries because British Columbia processors furnish much of the equipment used in the fishery.

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TWO ATLANTIC CRAB SPECIES SHOW PROMISE

Of the various crab species off the Canadian Atlantic coast, the spider or "queen" crab (Chionoecetes opilio) and the rock crab (Cancer irroratus) show promise for increased commercial use in the near future, says the Canadian Department of Fisheries.

The spider crab is larger, of higher quality, and easier to process, but it is probably much less abundant and less widely distributed than the rock crab. It may make significant contributions to dragger catches in the Gulf of St. Lawrence--but seems unlikely to form the basis of an independent fishery.

Canadian Atlantic landings of spider crab have not exceeded 18,000 pounds a year. Exploratory fishing began in 1965 as a joint Canadian Federal-Provincial project. It expanded to include 3 exploratory vessels--1

Canada (Contd.):

operating from each Maritime Province. One vessel uses trawls; the other 2 use traps--steel framework with "poly" netting. Each trap can hold up to 300 pounds. Several large concentrations of spider crab have been found, including one estimated to be several miles long and six miles wide. The experiment also involves biologic studies and ways the spider crab can be processed for marketing.

Rock Crab May Supplement Lobster

The rock crab may become a valuable supplement to lobster catches, particularly if more efficient processing methods would permit higher prices to the fishermen. Its small size, low meat yield, high processing costs, low prices, and the difficulties in regulating a trap fishery for rock crab during closed lobster seasons tend to rule out an independent fishery.

The Jonah crab (Cancer borealis) does not seem to be caught in lobster traps in sufficient quantities to warrant appreciable commercial use--but information on seasonal and geographic variations in abundance is scarce. The red crab (Geryon quinquedens) shows real promise, particularly in conjunction with a deep-water trawl fishery for lobsters.

RARE MARINE SPECIES CAUGHT OFF CALIFORNIA COAST

A new species of angler fish and the largest whale fish on record have been caught in the San Clemente basin of the Pacific Ocean by marine biologists from the University of Southern California. The whale fish may also be a new species.

Both prize biological specimens were taken on the same day by researchers aboard the research vessel Velero IV, operated by the University of Southern California's Department of Biological Sciences and the Hancock Foundation. While using a large net, the research team caught both fish in the 7,000-foot deep waters south of San Clemente Island, 60 miles off the California coast. The cruise of the Velero IV is part of an investigation the University is making on mid-water organisms. The study, financed by a $43,400 National Science Foundation grant, will seek to identify various types of fish in open water and to determine how their living habits relate to their environment.

The angler fish was identified as a Gigantactis, but when studied for further classification it could not parallel any of the nine known species of that genus. The fish differed from any known species, first of all, because it had more pectoral fin rays than any other. The bony structure inside the head, which enables the fish to open and close the lower jaw to wash water over the gills, was much better developed. Angler fish are so named because they have antenna-like filaments with light-producing photophores which serve the fish as a lure or bait. In the specimen taken, the "bait" had many more appendages than other species and a different and more slender shape. Most angler fish of that genus are less than a foot in length. This specimen was 16 inches from the tip of the snout to the end of the vertebral column. It was the largest of its kind ever discovered.

The whale fish, largest in its family, is a member of the Gyrinomimus genus. It was more than a foot long. Like all whale fish, it had a large head, tiny eyes, gaping jaws, and lateral line pores. One of the marine biologists said that it was not possible at the present time to classify the whale fish with any of the four known Gyronomimus species. A study was to be made of all its characteristics before the determination can be made.

LATIN AMERICA

Mexico

PLANS SHRIMPING EXPANSION IN INTERNATIONAL WATERS

Mexican shrimp catches reached peak in 1961 of 75,000 metric tons but leveled off in 1964 and 1965 to 70,000 and 60,000 tons. High prices kept 1965 ex-vessel value close to US$45 million, about 1964 value.

To further extend industry beyond coastal waters, present fleet will be doubled to over 1,000 vessels, many sonar-equipped.

The disclosure of these plans followed the signing of 3-year contract between fishing cooperatives and vessel owners. Leaders estimated shrimp take--expanded to new areas during contract period--of at least 2.5 billion pesos (US$200 million). Most of the catch, principally in frozen form, will be exported to the United States.

Reversing the usual trend of U. S. vessels off the Mexican coast, at least 28 Mexican shrimp vessels were already operating in international waters off the Texas coast in mid-September. (Mexico City News, Sept. 17, 1966.)

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GULF SHRIMP FISHERMEN WIN IMPROVED CONTRACT

Shrimp fishermen of Gulf ports began fishing on September 21 under a new 3-year contract. The contract between vessel owners and the fishermen's cooperatives was signed September 14. Although the fishermen's benefits were increased considerably, vessel owners reportedly will still be able to make a profit, especially with current high prices in U. S. and Mexican markets.

Under the new price scale, the crew is paid 2,990 pesos (US$239) a metric ton for all shrimp larger than 26 to the pound (heads-off weight), and 1,300 pesos (US$104) for those 26 to the pound, or smaller. At present prices and usual size proportions, this is said to amount to about 40 percent of the value. At conversion rate of 12.5 pesos to the dollar, and 2,204 pounds to metric ton, the fishermen receive about 10.85 U. S. cents a pound for large shrimp, and 4.72 U. S. cents for small shrimp.

Crew Member	Large Shrimp		Small Shrimp	
	Pesos	US$	Pesos	US$
	(Per Metric Ton)			
Captain	1,050	84	410	33
Engineer	820	65	350	28
Winchman	560	45	280	22
Cook	560	45	260	21
Total	2,990	239	1,300	104

In addition, the vessel owner pays each crewman 12 pesos (US$0.96) a day at sea for groceries and the cooperative associations a specified amount to help defray their administrative costs. At Ciudad del Carmen and Campeche, State of Campeche, this amounts to 650 pesos (US$52) a metric ton: of which 100 pesos (US$8) is contributed to support of University of the Southeast in Campeche, and a school in Carmen. At Tampico, the payment is 550 pesos (US$44) a ton. The vessel owner pays all taxes, costs of operation, and provides nets and other equipment.

Gulf vs. Pacific Shrimping

Shrimp fishing on the Gulf Coast differs from the Pacific Coast in at least two respects, which make contract comparisons difficult: On the Gulf, most vessels are owned by private individuals who are often the owners of the freezing plants. The crewmen are paid by the owners. On the Pacific, most vessels are owned by fishermen's cooperatives to which the crewmen belong. On the Gulf, the shrimp belong to the vessel owner, and he pays the crew in money for catching them. On the Pacific, the vessel owner, whether an individual or cooperative, and the crew share shrimp ownership. Disputes on the Pacific concern division of catch and expenses. The somewhat simpler method of owner paying crew a certain amount per unit of catch makes for easier negotiations. (U.S. Embassy, Mexico, D. F., September 28, 1966.)

Cuba

PLANS TO EXPAND STATE-OWNED FLEET

Before the Castro Revolution, the Cuban National Institute of Fishing ("Instituto Na-

Cuba (Contd.):

cional de la Pesca" (INP)) did not own or operate commercial fishing vessels. After Castro's takeover, and the nationalization or expropriation of larger fishing companies, the INP built up a state-owned fishing fleet. The State Fishing Company ("Empresa Estatal de Pesca") was formed to increase fisheries production along Soviet lines--by direct state capital investment and ownership of the means of production. The company is important now and in potential export picture.

Today, the state-owned Cuban fishing fleet consists of 3 major segments: the Cuban fleet, the Gulf fleet, and the Cayo Largo del Sur fleet.

Status of State-Owned Fishing Company ("Empresa Estatal de Pesca")
CUBAN FISHING FLEET ("Flota Cubana de Pesca"):
June 30, 1965:
2 trawlers (bought from Poland in 1962); now used for research
5 tuna vessels (bought from Japan in 1962)
5 side trawlers (SRTs obtained from Soviets in 1962)
1 tuna vessel (Spanish owners; operates from Havana)
13 vessels on June 30, 1965.
Planned 1966 deliveries:
20 tuna vessels (from Spain)
6 Cod vessels (" ")
6 Victorian-class vessels (from Cuban shipyards)
32 vessels planned for 1966.
GULF FLEET ("Flota de Golfo"):
58 vessels (Lambda and Ro classes) June 30, 1965.
65 vessels (estimate) to be delivered by end of 1966 from Cuban shipyards
120-130 vessels at end of 1966.
CAYO LARGO DEL SUR FLEET:
June 30, 1966:
30 vessels (Sigma and Cardenas classes)
1 lobster boat (Cardenas shipyard)
31 vessels, June 30, 1966

• The Cuban fleet (table) is by far the most important. It is earmarked for rapid expansion. Founded in June 1962, it started operations with a few trawlers and tuna vessels bought or otherwise obtained from Poland, Japan, and the USSR. The tuna vessels operate mostly in the Gulf of Mexico and Caribbean, but they also have traveled to waters off Recife, Brazil, in the South Atlantic. A major expansion of this fleet was planned for 1966 with the purchase of 20 tuna vessels from Spain. Trawlers obtained from the USSR operated for a while with a Kaliningrad-based group of Soviet vessels fishing in the Gulf of Mexico. In 1965, when the USSR decreased its Gulf fishing, the 5 trawlers lost operational and exploratory support and their landings fell off 18 percent from 1964 (data available only for first half of both years). For a short time, the Cuban trawlers operated also on Georges Bank and off Canada's east coast. Finally, they settled down in the traditional fishery on Campeche Banks off the Yucatan Peninsula in the Gulf of Mexico. There will be an important expansion of Cuban fishing into North American waters in 1967, when the cod-fishing vessels ordered from Spain in 1965 for 1966 delivery become operational.

• The Gulf fleet has about 100 vessels of the "Lambda" and "Ro" classes--a capacity of 107 and 43 gross tons, crew of 15 and 10 fishermen, respectively. That fleet will be expanded greatly in coming years.

• The Cayo Largo fleet, based in Canarreos Key east of Isla des Pinos, is important as a training center for young fishery apprentices (about 200) from the Giron Fishing School, although the vessels are few and small. Cayo Largo itself is being built up as a fish-processing and ship-repairing base.

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SOVIET FISHERY SPECIALISTS VISIT

The Soviet Deputy Minister for Food Industries visited Cuba during the last week of September 1966. Included in his party were two top-flight engineers from the Soviet Ministry of Fisheries; both are associated with the Scientific Research Institute for the Mechanization of the Fishing Industry (NIKIMPR).

The NIKIMPR has designed all recently introduced mechanized lines in the Soviet fishing industry, both on shore and aboard ocean-going vessels. It is likely that the Soviet Union, under the technical fishery aid agreement with Cuba, is introducing in that country her recent innovations in fish processing.

Brazil

MOBILE FISH MARKETS ARE SUCCESSFUL

Mobile markets built on Volkswagen Kombi vehicles and used by the State Government of Bahia, Brazil, have been successful in selling frozen fish and a few other products.

Brazil (Contd.):

The fish sold through this system are being priced at about 34 U. S. cents a pound and less. Chickens cost about 50 U. S. cents a pound. There are 16 such mobile units with refrigeration equipment operating in and around Salvador. The Governor explained that these mobile markets help keep prices down in stores around the city selling similar products. He claimed that, politically, the impact of these mobile markets and stationary government-operated markets had been more important to him than his highway development program, water works program, electrical program, and even his educational program.

The markets operate at cost. Prices cover expenses and amortization of equipment. A 1 percent sales commission is given to drivers of the mobile units, and this has been sufficient incentive for them to keep the units operating well. (U. S. Consulate, Salvador, Oct. 3, 1966.)

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JAPANESE WHALING TO INCREASE OFF BRAZIL

The Japanese expect to double the take of whales off Brazil this year. Recently, a North Brazilian fishing company was established jointly by a Japanese company with Brazilian capital. In the past, the take of whales (mostly sei) was about 120 a year. By August 1966, 150 whales had been killed and the take was expected to total 250 by the end of the season in November. Two factors are believed to have contributed to the larger catch: purchase of the whaler "Koyo Maru" from another Japanese company and use of that vessel's gunner; and a move to new whaling grounds.

With the decrease in the Antarctic whale quota, Japan must attempt to satisfy the domestic demand for meat and other whale products in 2 ways: by developing resources such as those off Brazil, and continued intense whaling activities in the North Pacific, the China Sea, and elsewhere. (Fishery Attaché, U. S. Embassy, Tokyo, Sept. 29, 1966.)

Ecuador

TUNA CANNERY CEASES OPERATIONS

A tuna cannery that is a subsidiary of a U. S. firm at Manta, Ecuador, ceased operations in late September 1966 due to a shortage of bait fish along the Ecuadorian Coast. The Directorate-General of Hunting and Fishing recently asked Manta tuna vessel fishermen to limit their bait-fishing activities to the area outside the bay in the vicinity of Bahia and Caraquez. Small-boat operators accused the tuna vessel operators and the canning firms of having fished out traditional bait-fish resources and asked for more government protection for their inshore fishing grounds. Part of the problem was related to the limited range of the Ecuadorian tuna fishing vessels. (U. S. Consul, Quito, Oct. 7, 1966.)

Peru

FISH MEAL PRODUCTION AND SUPPLIES ARE HIGH

Peruvian fish meal production for September 1966 was estimated at 100,000 to 120,000 metric tons, compared to 17,100 tons for September 1965. Exports for the first half of September 1966 were 33,800 metric tons versus 18,500 tons for the same period in 1965. Stocks on September 15, 1966, were 271,700 tons against 34,500 tons on September 15, 1965.

Prices for fish meal have dropped somewhat on the Hamburg (West Germany) market; however, no drastic drop in price appears imminent. Factors offsetting a drastic drop are: (1) Peruvian fishermen struck at the end of September and went on token strike in early October 1966; if strike continues, prices could stabilize or trend upward; and (2) recovery in world-wide consumption of fish meal has been under way since July or August 1966; it may be stabilizing influence if it continues for next 3 or 4 months. But world price could be forced down if there is excessive Peruvian production of fish meal when fishermen's strike threat ends--combined with an abundant anchovy resource. (Oil World Weekly, Sept. 30, and Oct. 7, 1966.)

EUROPE

USSR

1965 FISH MEAL PRODUCTION IS HIGH BUT BELOW NEEDS

During 1965, the USSR produced 240,000 metric tons of fish meal--twice the 1963 figure--but still far below the needs of agriculture and the poultry industry. These are estimated at 500,000 tons. Meal production exceeded the planned quota of 200,000 tons by 20 percent, or even more if the whale meal was not included in the fish meal total.

To satisfy the growing need for meal products, the Soviet 5-Year Plan (1966-1970) provides for a fivefold increase in production to 1 million metric tons by 1970. Of that total, 80 percent will be produced aboard fishing vessels.

Although the USSR needs fish meal, she has not imported any. Small traditional exports of about 4,000 tons a year are made to Czechoslovakia and other East European countries. In 1965, about 6,700 tons of meal were exported to Japan from her Pacific fisheries.

Soviet studies show that the use of fish meal makes good economic sense. One metric ton of fish meal added to hog feed increases the yield of pork by 700-800 kg.; added to poultry feed, it increases egg production by 25,000 eggs. It also replaces 3 tons of vegetable feeds.

In 1963, the Soviets reported to FAO a production of 113,000 tons of fish meal and 28,000 tons of whale meal--compared to 40,000 tons of fish meal and 4,000 tons of whale meal in 1958. (Data for 1964 are not yet available.) (Rybnoe Khoziaistvo, Aug. 1966, and other sources.)

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DOUBLES EXPORTS TO JAPAN IN 1965

In 1965, the USSR exported to Japan almost 18,500 metric tons of fishery products valued at US$3.7 million--almost twice the 1964 figure and 8 times that of 1963; values increased proportionately (table). Fresh and frozen made up the bulk of fishery exports to Japan in 1965 (9,700 tons, or 52 percent) followed by fish meal (6,700 tons, or 36 percent). Bering Sea shrimp exports also increased greatly in 1965--to 1,600 tons from 50 tons in 1964--as did cod roe, herring roe, and shellfish meal.

Soviet Exports of Fishery Products to Japan, 1963-1964

Product	Quantity			1965 Value
	1965	1964	1963	
	(Metric Tons)			US$1,000 1/
Fresh and frozen:				
Herring	2,728	1,390	790	379
Salmon	700	1,138	236	611
Sea bream	127	715	13	19
Other fish	4,463	4,539	456	645
Shrimp	1,632	54	-	332
Other shellfish 2/	40	52	19	6
Total	9,690	7,888	1,514	1,992
Salted, dried and smoked:				
Cod roe	214	96	2	103
Herring roe	49	1	-	126
Other roe	6	-	-	2
Other fish	1,040	1,463	642	149
Other shellfish	9	36	-	8
Total	1,318	1,596	644	388
Canned:				
Caviar	194	181	108	212
Other	3	-	-	-
Total	197	181	108	212
Other products:				
Fish meal	6,734	-	-	1,008
Shellfish meal	527	352	43	66
Seaweeds 3/	5	523	170	1
Other 4/	5	-	-	3
Total	7,271	875	213	1,078
Grand Total	18,476	10,540	2,479	3,670

1/US$1.00 equals 360 yen.
2/Includes small quantities of live shrimp in 1964 and 1963.
3/Includes small quantities of edible seaweeds in 1965 and 1964.
4/In 1964, includes some agar-agar, shells, and other products.
Source: Trade of Japan, 1963, 1964, and 1965, Japan Tariff Association.

Japan exports practically no fishery products to the Soviet Union. However, the total trade balance in fishery and related products and services favors Japan because her shipyards build new fishing vessels for the Soviet Union, and repair, overhaul, and otherwise service the Soviet fishing fleet. The total annual cost of those export services exceeds considerably the total value of imports of Soviet fishery products.

Trade is beginning to play a large part in Soviet fishery policies. On one hand, the Soviets are interested in importing Western technical know-how (new vessels, processing machinery, gear, etc.) for which they have to pay in hard currency; this, on the other hand, spurs them to increase their fishery exports, especially to countries which can also pay in hard currencies (Japan for one).

USSR (Contd.):

Not until the early 1960s, soon after normalization of their political problems, did Japan and the USSR begin to trade in fishery products and services. It can be assumed that Soviet fishery exports to Japan will continue to increase.

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WHALE PRODUCTS EXPORTED TO JAPAN

During the first 9 months of 1966, about 3,000 metric tons of Soviet-produced whale meat were exported to Japan; by the end of 1966, over 5,000 tons of whale meal and other specialty whale products (fins, hearts, peritoneum, etc.) were slated to be exported. It seems that the Soviet-Japanese fishery trade, which expanded substantially in 1965, is increasing further in 1966.

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SELLS ALASKA POLLOCK TO JAPAN FOR FISH MEAL

Two Japanese fishery firms were scheduled to negotiate with the USSR to buy 45,000 metric tons of Alaska pollock in 1967 from Soviet vessels fishing off West Kamchatka in the Sea of Okhotsk. Because of market conditions, the firms hope to obtain a more favorable price in 1967 than the US$20.50 a metric ton paid in 1966. The fish will be used to manufacture fish meal.

Next year will be the third that Japan has bought Alaska pollock. Meal made from it is of high quality and wanted in domestic and export markets. (Kihon Keizai Shimbun, Sept. 22, 1966.)

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MURMANSK FISHERIES ARE EXPANDING

The Main Administration of Northern Fisheries at Murmansk is about to receive 11 large fishing and fish-processing vessels. Poland will deliver 3 large freezer stern trawlers and 2 base ships, Denmark 2 large production and transport refrigerators, and Finland 1 tanker. The remaining 3 vessels will be constructed in domestic shipyards: 2 fish carriers in Nikolaev-on-the-Black Sea, and 1 production and transport fish carrier in Leningrad shipyards. This is only one example of the large Soviet program of buying fishing vessels abroad--and the important role foreign shipyards play in supplying modern vessels to the expanding fishing fleet.

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NEW STERN TRAWLERS REACH PACIFIC FLEET

In August and September 1966, the Far Eastern Main Fisheries Administration received at least 6 large stern trawlers of the Maiakovskii class built in the Soviet Union. They were distributed equally among the largest Pacific Regional Fisheries Administrations: Primorskii Krai (the Aleksandr Kraev and the Ivan Chernopiatka), Sakhalin (the Valentin Kotelnikov and the Vasilii Vinevnikov), and Kamchatka (Petr Ovchinnikov and Boris Gorinskii). It is believed that most of the new additions will be used in fisheries off U.S. coasts.

Other recent additions to the Soviet Pacific Fishing Fleet include the Vasilii Putintsev, a 12,000-gross-ton floating factory of the Zakharov class (2 more are under construction at Leningrad Shipyards); a modern refrigerated fish carrier; the 6,400-gross-ton Bashkir, and 5 large fish-processing factoryships of the Spassk class (18,000 gross tons) bought from Japan.

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FLAGSHIP RETURNS FROM NORTHEASTERN PACIFIC

The fishing fleet flagship "Churkin" returned to Vladivostok on September 15, 1966, with 13,800 metric tons of fish (including 2,420 tons of Pacific hake) caught off the U.S. Pacific Northwest.

The Churkin left Vladivostok late in 1965, worked in the Sea of Okhotsk and, since May 1966, serviced the fleets fishing first Pacific perch and then hake off Oregon and Washington.

Aleksandr Chepur, Commander of the Soviet fleets operating off the Pacific Northwest, was aboard the Churkin.

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USSR (Contd.):

PACIFIC SQUID FISHERY IS PRODUCTIVE

A Soviet fleet was fishing for squid in the South Kurils in mid-1966. Like the shrimp fleet off the Shumagins, the squid fleet belongs to the Soviet state-owned DALMORPRODUKT firm. The firm operates principally in fisheries for export and is administratively attached to the Far Eastern Fisheries Administration. Catches were good--as much as 100 metric tons a night. Most of the squid will be exported to Japan. In July 1966, the firm received orders from Japanese importers for squid, sea urchins, and other marine invertebrates.

The Soviets are continuing their efforts to increase fishery exports by expanding into new fisheries yielding good export items. Recent examples of this trend are the Soviet fishery for spiny lobsters off S. Africa and shrimp in the Indian Ocean.

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FISHING IN BARENTS SEA IS POOR

Fishing vessels of the Northern Fisheries Administration at Murmansk reported extremely poor catches in August and September 1966. Two-thirds of all vessels, including most stern factory trawlers, fishing in the Barents Sea did not fulfill the August monthly catch quota. The Murmansk administrators decided to send most of the unproductive vessels to the Northwest Atlantic.

Conditions are better in the Norwegian Sea where Soviet medium side trawlers are taking excellent catches of herring with drift nets.

Soviet fishing troubles in the Barents Sea are probably due to years of overfishing. As a result, the USSR is planning increased research (alone and with other countries) and explorations for new resources.

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CAPELIN STOCKS IN BARENTS SEA ARE LARGE

Preliminary exploratory research off Hopen Island (below Spitzbergen Islands) showed large concentrations of capelin, used principally for fish meal and bait by other countries. The Polar Scientific Research Institute for Fisheries and Oceanography (PINRO) believes that yearly catches of 300,000-400,000 metric tons can be landed. In 1964, the Soviets landed only 400 tons. The new resource was discovered through increased efforts to offset poor Soviet catches from the Barents Sea.

Norwegian landings of capelin were 217,000 tons in 1965; in the first 8 months of 1966, totaled over 300,000 tons.

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RESEARCH VESSEL VISITS AUSTRALIA

The flagship of the Soviet Pacific fishery research fleet, "Akademik Berg," visited Melbourne, Australia, in early May 1966. The 3,800-gross-ton stern trawler, constructed in 1963, has a crew of 86 including 10 fishery scientists. The captain told an interviewer that the Soviets are interested in redfish and snapper, jackass fish, deep-sea travella, and various other fish. The Soviets have no interest in catching shark or spiny lobster.

The Captain also reported numerous sightings of tuna schools and believes that large tuna resources are available in the area. The Akademik Berg did not attempt to catch tuna because it lacked purse-seine equipment. (Melbourne Fish Trades, June 1966.)

Note: The Australian journal comments: "4 vessels of this type could land in a year the equivalent of the total annual Australian fisheries catch" (76,000 metric tons in 1964).

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CONDUCTS HERRING RESEARCH IN BERING SEA

In early October 1966, the medium freezer trawler SRTM-8452 of the Pacific Scientific Institute for Fisheries and Oceanography (TINRO) sailed for a 6-month research cruise in the Bering Sea to study wintering herring concentrations and the biological principles governing their formation. This is the first time the Soviets have studied winter herring in the Bering Sea; heretofore, their research was conducted mainly in the Sea of Okhotsk and off Kamchatka, where large commercial herring concentrations occur in early fall.

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USSR (Contd.):

VESSELS RETURN FROM
PACIFIC RESEARCH CRUISE

In late August and early September 1966, two TINRO fishery research vessels, Adler and Iskatel', returned from extended cruises in the Eastern Pacific. The Adler conducted exploratory research from off British Columbia to Mexico to study saury, mackerel, Pacific ocean perch, sardines, hake, halibut, crustaceans, and various invertebrates. Research focused on environmental factors affecting the distribution, behavior, and formation of commercial concentrations of those species.

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RED SEA RESOURCES STUDIED

The "Akademik Kovalevskii," an oceanography and research vessel of the Ukrainian Academy of Sciences, is continuing the research in the Red Sea begun two years ago. The principal scientific purpose of this expedition is to determine the relationship between the plant and animal life of the Red Sea and the Mediterranean and Black Seas. On its three-month cruise, from August through October 1966, the research vessel was scheduled to resupply at, or visit, the Red Sea ports of Yemen, Egypt, Sudan, and Somalia. They all receive Soviet fishery aid.

Denmark

DATE OF PRODUCTION TO BE REQUIRED ON "SEMIPRESERVED" FISH PRODUCTS

Changes in labeling requirements for "semipreserved" fish products to be sold in Denmark were announced by the Fishery Ministry, September 1, 1966. They become effective January 1, 1967. The production date on semipreserved retail packs, whether of domestic or foreign origin, will have to be specific rather than in code. The packs also must be specifically labeled "Semi-preserved." (Codes can still be used for date labeling of heat-processed sterile-canned packs.)

In Denmark, semipreserves are herring, caviar, mussels, etc., preserved for a limited time with sugar, salt, acid, or other preservative (but does not include smoked, frozen, or dried products). (U. S. Embassy, Copenhagen, Sept. 21, 1966.)

East Germany

BEGINS FISHING ON
NORTHWEST ATLANTIC'S GEORGES BANK

A second large factory stern trawler, the "Willy Bredel," ROS-313, began operating on Georges Bank September 7-14, 1966. The first one, the ROS-312, began at the end of August. The research vessel "Ernst Haeckl" was at work off the mouth of Rio De La Plata, not far from Montevideo, Uruguay, in late September 1966.

Iceland

SETS EX-VESSEL PRICES
FOR SHRIMP, COD, HADDOCK, HERRING

Ex-vessel prices set by the Icelandic Fish Pricing Board for shrimp, cod, and haddock, September 16 to December 31, 1966 were:

	Prices			
Shrimp in the shell 1/	Kr./kilo 8.85		USc/lb. 9.32	
	Cod 2/		Haddock 3/	
	Kr./kilo	USc/lb.	Kr./kilo	USc/lb.
Cod and Haddock:				
1st Grade-A:				
gutted, head-on	3.97	4.18	4.40	4.63
ungutted	3.41	3.59	3.70	3.90
1st Grade-B:				
gutted, head-on	3.43	3.61	3.80	4.00
ungutted	2.95	3.11	3.26	3.43
2nd Grade:				
gutted, head-on	2.67	2.81	2.96	3.12
ungutted	2.30	2.42	2.54	2.67

1/Minimum size 350 a kilo (159 a pound).
2/Size 40-57 cm. (about 16-22 inches).
3/Size 40-50 cm. (about 16-20 inches).
Note: Prices based on standards fixed by quality inspectors.

The Icelandic Pricing Board also established minimum ex-vessel prices for October 1, 1966, to February 28, 1967, for herring caught along south and west coasts of Iceland. Prices are:

	Price	
	Kr./Kilo	U.S. Cent/lb.
Herring for salting, freezing, & canning	1.70	1.79
Iced herring	1.55	1.63

Iceland (Contd.):

Minimum ex-vessel price set for herring sold for reduction October 1-31, 1966, was 1.12 kronur per kilogram (1.18 U. S. cents a pound). (U. S. Embassy, Reykjavik, Oct. 6 and 13, 1966.)

Note: Icelandic kronur 43.06 equals US$1.00.

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FISHERY PRODUCTS EXPORTS PRESENT UNEVEN PICTURE

During January-April 1966, Iceland sharply increased exports of fish meal and oil compared with the same period in 1965, according to the periodical Hagtidinid, May 1966. But exports of frozen fish fillets and stockfish decreased in the first 4 months of 1966.

Exports of Selected Fishery Products, January-April 1965-1966

Product	Jan.-Apr. 1966			Jan.-Apr. 1965		
	Qty.	Value f.o.b.		Qty.	Value f.o.b.	
	Metric Tons	1,000 Kr.	US$ 1,000	Metric Tons	1,000 Kr.	US$ 1,000
Salted herring	11,348	141,233	3,280	8,636	87,805	2,039
Other salted fish	4,695	94,287	2,190	9,180	161,264	3,745
Stockfish	2,481	78,978	1,834	3,708	108,129	2,511
Herring, frozen	12,926	83,667	1,943	12,965	82,505	1,916
Fish fillets, frozen	11,540	318,599	7,399	15,936	373,219	8,667
Shrimp & lobster, frozen	269	29,829	693	136	13,349	310
Fish and whale oil	36,796	289,401	6,721	20,063	170,142	3,951
Fish meal	47,591	377,612	8,769	32,334	219,555	5,099

Note: Values converted at rate of 1 krona equals 2.32 U. S. cents.

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REPORTS LANDINGS BY PRINCIPAL SPECIES, JANUARY-MARCH 1965 & 1966

Species	Jan.-Mar.	
	1966	1965
	. . (Metric Tons) . .	
Cod	73,249	80,659
Haddock	8,669	21,123
Saithe	5,968	12,007
Ling	1,520	2,100
Wolffish (catfish)	3,821	3,140
Cusk	948	1,145
Ocean perch	2,468	4,634
Halibut	154	175
Herring	17,394	48,815
Capelin	123,742	48,797
Shrimp	721	394
Other	1,289	742
Total	239,943	223,731

Note: Except for herring, which are landed round, all fish are drawn weight.

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HOW FISH WERE USED

How Utilized	Jan.-Mar.	
	1966	1965
	. . (Metric Tons) . .	
Herring and Capelin[1] for:		
Oil and meal	135,814	82,955
Freezing	2,919	10,973
Salting	1,452	3,137
Fresh on ice	937	546
Groundfish[2] for:		
Fresh on ice	10,033	12,833
Freezing and filleting	40,274	54,682
Salting	25,603	34,297
Stockfish (dried unsalted)	18,416	19,758
Canning	2	17
Oil and meal	484	493
Crustaceans for:		
Freezing	710	303
Canning	11	91
Home consumption	3,273	3,645

1/Whole fish.
2/Drawn fish.
Source: Aegir, June 1966.

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LABOR-SAVING MACHINERY MEETS NEED

The shortage of labor has created a strong demand for labor-saving machinery. This may provide marketing opportunities for U.S. suppliers of fish-processing machinery. Also, U. S. processors may be interested in some new equipment developed in Iceland. Two machines were designed to clean lobster and trout:

Lobster Processing: A cleaning (gutting) machine can be operated by 4 women and equal the productivity of 16 women working by hand. Over an average 10-hour period, 1,800 kilograms (3,968 pounds) of lobster were cleaned and sorted.

The inventor is Sigmundur Johannson. Sales distribution will be handled by Arni Olafsson & Co., Sudurlandsbraut 12, Reykjavik, Iceland. Johannson is modifying the prototype and expects to have more detailed information and a brochure available on the improved machinery in late 1966.

Trout Processing: A machine that will wash and clean lake trout is being tested at a cannery. On a trial run, about 50 kilograms (110 pounds) of trout were processed. Between 80-90 percent of the processed trout emerged satisfactory for canning. The machinery, during the trial period, handled 50 trout a minute; with experienced operators, 70 trout a minute can eventually be processed.

Iceland (Contd.):

The inventor is Baldvin Jonsson, Sylgia Velavidgerdir, Laugavegur 27, Reykjavik, Iceland. The only machine in existence was designed for the Icelandic cannery Kjot og Rengi H. F., Karnesbraut 86, Kopavogur, Iceland. (U. S. Embassy, Reykjavik, Sept. 15 and Oct. 13, 1966.)

Italy

DUTY-FREE FROZEN TUNA QUOTA CHANGE SOUGHT

The tuna industry has asked the government to begin negotiations immediately to have the present restrictions on frozen tuna imports liberalized. In 1965, following negotiations at Brussels with other European Common Market (EEC) nations, Italy was permitted to (1) import from non-EEC countries 14,000 metric tons of frozen tuna duty free; and (2) assess an ad valorem duty of 0.5 percent for tuna imports between 14,000-40,000 metric tons, and 15 percent over 40,000 tons.

Beginning in 1970, Italy is to adopt an EEC common external tariff policy. Then, under the Common Market tariff schedule, she will be permitted to import 14,000 tons of tuna duty free--but must assess an ad valorem duty of 35 percent for imports exceeding that amount. Imposition of such a high tariff is expected to seriously hurt the Italian tuna canning industry, which presently imports about 40,000 tons of tuna a year, mostly from Japan. For this reason, the industry wants to have the 14,000-ton duty-free quota raised to 40,000 tons. (Nihon Suisan Shimbun, Sept. 5, 1966.)

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FROZEN TUNA MARKET IMPROVES

The frozen tuna market showed some signs of improvement beginning in September, according to a report in the Japanese periodical Suisan Tsushin, September 21, 1966. Frozen yellowfin tuna (dressed with tail) was said to be bringing c.i.f. (including 3-percent commission) US$570-580 a metric ton, with some buy offers at $590 a ton. The market improvement was attributed to "normalization" of sales to the United States and increasing need for tuna in Japan.

Portugal

CANNED FISH PACK AND EXPORTS DROP

Due to a smaller pack of tuna, the pack of canned fish in oil or sauce during first-half 1966 was down 12 percent in weight from first-half 1965. The important sardine pack remained at the same level.

Canned Fish Pack, Jan.-June 1966

Product	1966 Jan.-June		1965 Jan.-June	
	Metric Tons	1,000 Cases	Metric Tons	1,000 Cases
In oil or sauce:				
Sardines	9,122	480	9,181	483
Chinchards	248	13	501	26
Mackerel	2,074	83	2,071	82
Tuna & tunalike	2,274	76	4,157	138
Anchovy fillets	2,977	298	2,457	246
Others	508	27	1,194	63
Total	17,203	977	19,561	1,038

Canned Fish Exports Are Down

Exports of canned fish in oil or sauce in first-half 1966 were down about 5 percent from first-half 1965. A drop in sardine exports was partly offset by larger shipments of canned mackerel, tuna, and anchovy fillets.

Canned Fish Exports, Jan.-June 1966

Product	1966 Jan.-June		1965 Jan.-June	
	Metric Tons	1,000 Cases	Metric Tons	1,000 Cases
In oil or sauce:				
Sardines	24,052	1,266	28,371	1,493
Chinchards	216	11	515	27
Mackerel	4,367	175	2,076	83
Tuna & tunalike	1,462	49	1,072	36
Anchovy fillets	1,958	196	1,575	158
Others	391	20	361	19
Total	32,446	1,717	33,970	1,816

Portugal's principal canned fish buyers in first-half 1966 were: Italy, 5,556 metric tons; United Kingdom, 4,534 tons; Germany, 3,339 tons; France, 2,814 tons; the United States, 2,744 tons; and Belgium-Luxembourg, 2,633 tons. Germany's purchase of canned fish in first-half 1966 dropped 55 percent from first-half 1965. (Conservas de Peixe, Aug. 1966.)

Spain

REVISES LABEL RULES
FOR IMPORTED FOODS

Spain has revised label requirements, effective November 5, 1966, for imported processed food products to be sold there. They apply to preserved, semipreserved, and salted fishery products, and require the following information in Spanish on the container or on attached label:

(1) Country of origin; (2) Usual common name of preserved product in letters not less than 3 millimeters (mm.) high; (3) Forms of preparing preserved product in letters not less than 2 mm. high, i.e., "in sauce," "with tomato," "with brine," "in pure olive oil," "in seed oil," "in natural state," "in simple syrup," etc.; (4) All ingredients of the preserved product should be listed according to order of importance; (5) Additives, such as coloring materials, antioxidation products, preservers, etc.; (6) Net minimum weight expressed in units of metric system; (7) Instructions, if required, for use or preparation of preserved or prepared product; (8) For seimpreserved fish products, in Spanish and visible, the phrase "semiconserva, mantengase en sitio fresco" (semipreserve, store in a cool place), with month and year of manufacture.

Additional information in other languages will be permitted if it does not contradict or confuse the Spanish text. The letters of other languages may be smaller. (U. S. Embassy, Madrid, Oct. 1, 1966.)

United Kingdom

FIRM FREEZES PRICE FOR COD FILLETS

On August 30, 1966, a large British firm announced that its basic prices for frozen cod fillets would remain unchanged for the 12-month contract period beginning October 6, 1966.

U. S. COAST GUARD AND ENFORCEMENT OF
INTERNATIONAL FISHERIES TREATIES

Enforcement of international treaties to preserve valuable marine resources in North American waters is a traditional function of the U. S. Coast Guard. Partly due to Coast Guard efforts, the valuable seal herd on the Pribilof Islands off Alaska is thriving once again. Those animals were on the verge of extinction at the turn of the century by Americans and foreign hunters. The same holds true for valuable species of fish to which the world may turn to more and more as it seeks new sources of high-quality protein.

Three Coast Guard officers in May 1965 boarded the Soviet tug Stremitelniy at Halifax to undertake a first-hand observation of Soviet law-enforcement techniques in the Grand Banks area. Later that month, three Russian officers boarded the Coast Guard cutter Acushnet for a similar period of observation. Following the observation, they were taken on a tour of the U. S. Bureau of Commercial Fisheries and of Coast Guard law enforcement units in the vicinity of Boston, Mass. Those activities were conducted under the International Convention for Northwest Atlantic Fisheries (ICNAF). (Release No. 16-65, U. S. Coast Guard, Washington, D. C.)

ASIA

Japan

IMPORTS OF MARINE PRODUCTS ARE RISING

From 1962-1965, Japan increased her imports of marine products:

Country of Origin	1965	1964	1963	1962
	(US$1,000)			
Korea Republic	15,995	15,916	8,328	7,439
Communist China	18,222	16,052	7,213	3,218
Peru	8,222	11,128	8,041	3,517
Mexico	10,374	9,623	7,755	2,022
United States	7,149	5,935	3,454	1,471
Hong Kong	5,838	3,844	5,302	1,572
Spain	5,764	2,790	1,188	14
South Africa	5,146	2,631	2,679	715
Australia	3,314	3,130	2,164	708
Thailand	3,902	3,052	1,186	94
USSR	4,389	2,722	659	149

The data show significant increases in imports from Republic of Korea, Communist China, Thailand, and the USSR from 1963 to 1964, and for Spain between 1964 and 1965. Imports from the United States show a somewhat steady increase over the four years. (Fishery Attaché, United States Embassy, Tokyo, Oct. 5, 1966.)

At its first meeting, the National Council of Fisheries Organizations for the Import of Marine Products considered a law to regulate the import of marine products by using an import quota system on certain designated products. The problem will be discussed further.

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EMPLOYMENT DROPS IN FISHING INDUSTRY

The 1965 Japanese fishing industry dropped in number of establishments, fishing vessels, and employment, according to the Ministry of Agriculture and Forestry, Statistics Division:

Item	1965	1964	Change from 1964
	No.	No.	%
Establishments engaged in marine fisheries and culture	293,000	297,000	-1.3
Fishing vessels	316,000	320,000	-1.4
Workers	880,000	895,700	-1.8

At least part of the reason for the declines is the fishing industry's move to increase the efficiency of operations and cut labor costs through automation, and by consolidation of vessels, facilities, and other operations. (Fishery Attaché, U. S. Embassy, Tokyo, Oct. 4, 1966.)

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CATCHES OF SQUID, MACKEREL, AND SAURY DECLINE

The 1966 catches of squid, mackerel, and saury, 3 of the most important coastal fish of Japan, are expected to be low:

Squid--generally less than last year, especially in the Japan Sea off Hokkaido.

Mackerel--less than last year, due primarily to the fish being farther from shore (associated with the area of warm water found farther offshore this year) and a decrease in the general abundance of fish.

Saury--as of end of September, catch was 100,000 metric tons, and the fleet was expected to catch 100,000 tons more in October. There is very little chance that the 300,000-ton goal will be reached this year.

The forecast of poor catches for these 3 species will probably be reflected in increased prices and perhaps some increase in imports to meet local demand and export commitments.

Horse mackerel--very poor catches of horse mackerel in August were reported in western Japan. Landings of mackerel and horse mackerel at Shimonoseki during August were only 6,500 metric tons (just half the amount landed in August of the previous year). September landings appeared to be no better. The shortage is especially critical for the minced meat processors in western Japan who depend on horse mackerel for their main source of supply. Most of the processors are idle because of the lack of fish and the associated high price.

The failure of the fisheries does not appear to be associated with abnormal weather or sea conditions. Because of the demand for minced meat by the Japanese processors for the various fish paste products, it is expected that the shortage will result in an increase in the import of fish from the Republic of Korea, the USSR, and other neighboring countries.

Japan (Contd.):

(Fishery Attaché, U.S. Embassy, Tokyo, Oct. 6 and 7, 1966.)

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FACTORYSHIPS RETURNING FROM EASTERN BERING SEA

Japanese factoryships operating in the Eastern Bering Sea have been returning to Japan with their products:

- The 10,000-ton "Gyokeui Maru" fleet reported a catch of 108,041 metric tons, which yielded: fish meal, 17,331 tons; fish solubles, 1,442 tons; fish oil, 576 tons; frozen fish, 4,896 tons; and minced meat, 1,013 tons.

- The catch for 1966 season for the 7,400-ton "Chichibu Maru" was: Pacific ocean perch, 13,000 metric tons; herring, 3,000 tons; other fish, 2,500 tons--a grand total of 18,500 tons.

- The production of shrimp by the 7,500-ton "Einin Maru" was only 145,000 cases of 48 6½-oz. cans (about half original target). The low production of shrimp in the North Pacific and Bering Sea was contributing to the rise in export price of this commodity. (Fishery Attaché, U. S. Embassy, Tokyo, Oct. 7, 1966.)

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FISH MEAL FACTORYSHIP COMPLETES NORTH PACIFIC OPERATION

The "Hoyo Maru," a Japanese fish-meal factoryship, completed fishing operations in the North Pacific on September 26. Its production was:

	Metric Tons
Total catch	95,500
Meal produced	14,860
Solubles produced	3,120
Fish oil produced	970
Frozen products produced	5,733

Included in the frozen products were 1,200 metric tons of minced meat. (Fishery Attaché, U. S. Embassy, Tokyo, Oct. 4, 1966.)

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1966 WHALE CATCH IN NORTH PACIFIC WAS GOOD

North Pacific whaling in 1966 brought good results. The fleets all reported abundant sei and sperm whales and no reason to fear for their future. The fleets made the best kills in two areas: between 45° N. and 49° N. in the eastern Pacific, and between 45° N. and 53° N. in the Gulf of Alaska. Those areas had rarely been fished in the past. The catches for one of the three fleets, the "No. 2 Kyokuyo Maru," were:

Month	Sei Whales	Sperm Whales
	(Number)	
May	28	71
June	235	355
July	652	194
August	469	308
September	233	1
Total	1,617	929

In previous years, most Japanese whaling was in the Aleutian area or in the Western Pacific, but those grounds no longer are providing good catches. This year, the best fishing was in the eastern Pacific off Canada and in the Gulf of Alaska. This is a relatively new area and no doubt the reason for the good catches. (Fishery Attaché, U. S. Embassy, Tokyo, Oct. 6, 1966.)

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EXPORTS 1¼ MILLION CANNED TUNA IN OIL AND SPECIALTY PACKS

The Japan Canned Tuna Packers Association, during April-August 1966, validated for

Exports of Canned Tuna by Countries, April-August 1966

Countries	Tuna in Oil	Specialty Pack
	(No. Actual Cases)	
Exported to:		
West Germany	304,553	171,982
Canada	115,831	-
Netherlands	63,801	30,495
Switzerland	57,000	-
Aden	56,053	-
Lebanon	51,491	-
Belgium	49,759	28,460
Okinawa	31,714	-
Saudi Arabia	15,436	-
United Kingdom	14,763	10,000
Kuwait	14,522	-
Italy	10,333	-
Others	194,441	17,096
Total	979,697	258,033

Japan (Contd.):

export 979,697 actual cases of canned tuna in oil, and 258,000 actual cases of specialty pack tuna. Some best sellers in the specialty pack were: tuna in vegetable, 204,207 actual cases; tuna in jelly, 26,273 cases; skipjack, natural, 2,500 cases; and creamed tuna, 11,420 cases. (Suisan Tsushin, September 21, 1966.)

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EXPORTS OF FRESH AND FROZEN TUNA DECLINE

Fresh and frozen tuna validated for export by the Japan Frozen Foods Exporters Association in August 1966 totaled 14,986 metric tons, compared to 16,869 tons in August 1965. Exports for April-August 1966 totaled 75,870 metric tons, compared to 83,312 tons for the same 1965 period. (Suisancho Nippo, September 22, 1966, and other sources.)

Table 1 - Fresh and Frozen Tuna Exports, August 1966

	Exported to: United States	Overseas Bases	Other Countries	Total
	. .(Short Ton). .		. (Metric Ton) .	
Tuna:				
Albacore 1/	4,793.2	901.8	329.0	5,494.3
Yellowfin 2/	1,790.5	338.0	5,224.3	7,154.9
Big-eyed 2/	135.2	145.7	921.0	1,175.7
Skipjack 1/	293.2	-	60.0	325.9
Bluefin 2/	-	-	268.2	268.2
Tuna loins	625.0	-	-	567.0
Total	7,637.1	1,385.5	6,802.5	14,986.0

1/Round fish.
2/Gilled and gutted, dressed, and fillets.

Table 2 - Fresh and Frozen Tuna Exports, April-August 1966

	Exported to: United States	Overseas Bases	Other Countries	Total
	. .(Short Ton). .		. (Metric Ton) .	
Tuna:				
Albacore 1/.	23,007	5,602	1,925	27,873
Yellowfin 2/.	17,613	3,195	14,610	33,483
Big-eyed 2/.	1,439	630	5,279	7,156
Skipjack 1/	4,596	9	336	4,513
Bluefin 2/.	-	-	833	833
Tuna loins	2,218	-	-	2,012
Total	48,873	9,436	22,983	75,870

1/Round fish.
2/Gilled and gutted, dressed, and fillets.

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EXPORTS OF CANNED KING CRAB GOOD BUT SUPPLIES INADEQUATE

Exports of canned king crab were good this year. At the end of August, shipments were:

Destination	No. of Cases 1/
France	31,000
United States	15,000
Great Britain	15,000
Belgium	2,100
Netherlands	2,000
Australia	950
Other	3,850
Total	69,900

1/48 No. 2 cans of fancy pack per case.

Various reports indicate that the export trade is receiving strong competition from domestic sales. The quantity allocated for export this year is reported small. (Suisan Keizai Shimbun, Sept. 13, 1966.)

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FISH OIL PRODUCTION UP IN 1965

Production of fish oil in 1965 totaled an estimated 30,000 metric tons. It was only slightly under the 5-year average (1961-1965) of 30,800 metric tons. Perhaps most significant was the recovery of oil production from the lows of 25,218 and 22,503 metric tons in 1963 and 1964, respectively. Most oils from the various fish have decreased over the five years--except from sardine, cod, and Alaska pollock. The biggest increase in 1965, however, was in oil from unidentified species, including oil from fish livers. (Fishery Attaché, U. S. Embassy, Tokyo, October 21, 1966.)

Production of Fish Oil by Species, 1961-1965

Types of Oil by Species	2/1965	1964	1963	1962	1961
	. . . . . .(Metric Tons).				
Sardine	1,000	117	578	838	923
Herring	-	1	1	8	31
Atka mackerel	500	1,031	864	681	2,372
Flatfish	100	46	73	100	171
Saury	2,000	2,892	7,685	18,877	11,032
Squid	1,700	508	2,663	3,181	2,967
Shark	1,000	1,142	1,266	2,201	2,247
Cod-Alaska pollock	8,000	8,548	6,026	7,771	6,743
Other fish 1/	15,700	8,218	6,062	8,681	7,358
Total	30,000	22,503	25,218	42,338	33,844

1/Other fish oil includes liver oil.
2/Figures for 1965 are estimates of Japan Aquatic Oil Association.

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Japan (Contd.):

EXPORT PRICE IS UP
FOR CANNED SHRIMP

An increase in the export price of canned shrimp was announced by a leading Japanese producer. The new prices are:

Can Size	No. in Case	Kind	Price Per Case	Amount of Increase
			US$	US$
No. 2	24	Mixed	9.00	0.50
No. 3	48	Mixed	10.80	0.60
No. 2	24	Broken	8.00	0.50
No. 3	48	Broken	9.60	0.60

Of the 150,000 cases (No. 2 - 24/case) produced this year, about 50,000 cases were sold at the first sale. At the second sale, 50,000 cases were offered at a higher price and were sold to the United Kingdom and France with no difficulty. So it is felt that the remaining 50,000 cases can be sold at the prices quoted. (Fishery Attaché, U.S. Embassy, Tokyo, Oct 7, 1966.)

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SALMON ROE PRICES DROP

Prices in Japan of salmon roe imported from the United States and Canada have dropped. Imports in early October totaled about 2,400 tons (2,100 tons from U.S.; 300 tons from Canada); they exceed the original forecast of 2,000 tons. At least part of the increase was due to a good catch of pink salmon in southern Alaska. Further, a prediction of strong domestic demand for roe had been based principally on the increased income of farmers enjoying a good rice harvest. This demand had not helped, possibly because of the sudden increase in September imports.

The retail price of top-quality salmon roe was about US$1.90 a pound for pink, about $2.00 for chum, and $1.75 to $1.90 for red. Second- and third-grade roe sold 25¢ to 50¢ lower. Those prices are about 15 percent below those reported at the beginning of September.

Reasons for Price Drop

The price drop was attributed to two factors: This year's quality is inferior to last year's, especially for pink salmon roe: the first-grade product this year is equivalent to last year's second-grade product. Second, around 1,700 tons of pink roe have been imported so far this year and only half has been sold. Some traders are beginning to dump salmon roe on the market, forcing the price down.

U.S. and Canadian production and export of salmon roe to Japan has increased rapidly during the past 2-3 years. A supply of 2,000 tons is reported to be optimum. Some in the industry feel that market conditions were due to the sudden influx of roe and that better-timed deliveries would not have depressed prices. (Fishery Attache, U.S. Embassy, Tokyo, October 4, 1966.)

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EXPORTS OF CANNED KING CRAB
TO UNITED KINGDOM DROP

Japan will export less than 40,000 cases (48 7-oz. cans) of canned king crab to the United Kingdom in 1966. Originally, 45,000 cases had been allocated for export.

Part of the reason for this small amount is the exceptionally strong domestic demand for king crab--another reflection of increasing Japanese demand for their own higher-priced fish products. (Fishery Attaché, U.S. Embassy, Tokyo, Oct. 7, 1966.)

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U.S. MARKET FOR
CANNED TUNA WEAKENS

The United States market for Japanese canned tuna shows signs of weakening, according to the chief of the Tuna Division, Japan Canned Goods Export Association, who visited the U.S. September 5-25, 1966.

This was his evaluation of the American market: the average price of Japanese canned tuna this year is a little higher than last year; the amount sold will be less, increasing the inventory in Japan; the Japanese high cost of fish will not allow a price cut; American supermarkets are selling tuna at a fairly low price, and it is difficult to move Japanese tuna because of the high price (Japan must maintain her share of the market); and the Japanese large can is no longer superior in quality to the American pack; since U.S. companies are making a greater effort to sell their product, Japanese companies should not expect as many sales in the future.

Japan (Contd.):

This report reflects the economic problem Japan now faces, because of high labor and other production costs, in meeting competition in foreign markets. (Fishery Attaché, U. S. Embassy, Tokyo, October 5, 1966.)

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CANNED SAURY TO BE SOLD TO UNITED STATES

In spring 1966, 250,000 cases of horse mackerel were exported to the United States and an additional order of 300,000 cases could not be filled. Instead Japan shipped 100,000 cases of mackerel to the United States.

Many trading companies are considering the export of canned saury to the United States to supplement mackerel. The U. S. public does not know saury, but it is similar to the sardine in quality, taste, and appearance, and so Japanese interests feel that they should be able to develop a good market for it. Much of the canned saury now goes to Southeast Asian countries. (Fishery Attaché, U. S. Embassy, Tokyo, Oct. 7, 1966.)

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HAKE GAINING CONSUMER ACCEPTANCE

Hake ("merluza") caught off South Africa is gaining consumer acceptance in Japan, states a report from Shimonoseki, southern Japan, the home base of many large trawlers operating in the South Atlantic. Restrictions imposed by importing countries to protect their fisheries and fishing industry have made it difficult for Japan to export "merluza" to Europe, where demand is good. As a result, the trawlers operating in the Atlantic are compelled to ship their catches (dressed and filleted) to Japan.

Hake was not well known in Japan but, beginning in late 1965, firms began to promote it aggressively. The promotion appears to be a success. Despite increased shipments to Japan, consumption has increased, and the price landed in Japan is holding above 100,000 yen a metric ton (12.6 U.S. cents a lb.). (Nihon Suisan Shimbun, September 21, 1966.)

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TO CULTIVATE PEARLS IN FIJI ISLANDS

The Fiji Government has given a Japanese company a five-year license to cultivate pearls at Vukanicuku Bay, Gau Island. (Pacific Islands Monthly, July 1966.)

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JOINT WHALING VENTURE WITH NORWAY UNDER WAY

A major Japanese whaling fleet left November 1 on a joint venture with a Norwegian company. The Japanese fleet consists of the mothership "Koyo Maru" and 5 catcher boats. Also, the "No. 2 Banshu Maru" was chartered to the Norwegians. The charter rate this year is about US$890,000, about $280,000 higher than last year. The Japanese are entering such joint undertakings to overcome their short supply of whale meat resulting from the decrease in Antarctic whale production. (Fishery Attaché, U.S. Embassy, Tokyo, Oct. 4, 1966.)

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HOKKAIDO IS REBUILDING SALMON RUNS

The Hokkaido salmon fishery opened September 1 and the catches were good. Officials predicted that the run will approximate the same high level of the past three years, probably second only to the high year of 1965. The expected total run was about 4,000,000 fish, of which 620,000 were to be allowed to escape for spawning--to produce about 620 million eggs.

The Fishery Agency plans to stock experimentally red salmon fry in the Nishibetsu River near Nemero, Hokkaido. In 1960, 50,000 kokanee fry were released in the Nishibetsu River; in 1964, 5 or 6 parent red salmon returned to spawn. Encouraged by the return, the Agency will release annually 200,000 fry for the next five years. Fry are held for one year at the hatchery before release. If the study proves successful, the Agency plans to expand the plants to other rivers by using eggs purchased from Alaska, or other sources if necessary. (Fishery Attaché, United States Embassy, Sept. 20, and Oct. 4, 1966.)

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Japan (Contd.):

COMMUNIST CHINA
FISHERIES TEAM VISITS

On September 27, 1966, a fisheries team from Mainland China arrived in Tokyo for a visit sponsored by the Japan-Mainland China Friendship Society. The team will inspect fisheries facilities (principally in western Japan) and talk with representatives of the fishing industry and unions.

Japanese fishery circles are cooperating. They hope this will assist them in implementing the private Japan-Communist China Fisheries Agreement, prevent fishery disputes in the East China Sea, and increase fishery trade with China. (Nihon Suisan Keizai, Sept. 27, 1966.)

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IMPORTS FROM CHINA ROSE IN 1965

Imports of Chinese fishery products into Japan increased from about 18,840 metric tons in 1964 to over 28,130 tons in 1965. Imports of the largest single item--fresh and frozen shrimp--remained relatively stable (5,480 tons in 1964; 5,874 tons in 1965), but their value was two-thirds of the total value of all Japanese fishery imports from Communist China.

The largest quantity increases in 1965 were imports of Spanish mackerel and hairtails (both triple 1964 imports) and croakers (50 percent higher than 1964). The Japanese are especially anxious to increase imports of large shrimp for transshipment to world markets.

Republic of Korea

REPORT ON TUNA FLEET

South Korea's Atlantic tuna fishing fleet consists of 44-government-owned vessels with a gross tonnage of over 11,000 tons (see table). Vessels are based at Monrovia (Liberia) and Freetown (Sierra Leone). The Republic of Korea (ROK) now has the largest single group of tuna vessels fishing the South Atlantic. The tuna are sold to a large United States tuna packer. In 1967, another 6-11 vessels with a total tonnage of over 2,000 gross tons will be added.

Type of Vessel	Number	Total Gross Tonnage
Government owned:		
150 gross tons	32	4,800
530 gross tons	12	6,360
Privately owned	5-7	n. a.

The ROK tuna vessels are owned by the Fisheries Corporation of the Republic of Korea. They were constructed with credits obtained from the French-Italian consortium.

In addition to government-owned vessels, private tuna companies operate from 5 to 7 vessels in the Atlantic.

Three 200-gross-ton ROK tuna vessels fish in the Indian Ocean.

Off American Samoa, 46 ROK tuna vessels operated in August 1966; 29 fish for one of the two U.S. tuna packers with plants on the Island; 17 fish for the other. (U.S. Embassy, Tokyo, October 7, 1966.)

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NORWAY AND NETHERLANDS
PROMISE CREDITS

O Chung-Kun, ROK's Director of the South Korean Office of Fisheries, reported in Seoul on September 22, after a money-raising trip to Western Europe, that: the Norwegian Government had agreed to encourage private commercial loans for Korean fishery development totaling US$15-20 million; the Dutch Government will "support" the extension of a long-term loan of up to US$15 million to finance Korean purchases of motherships and stern trawlers; the French-Italian consortium, which has financed recent Korean purchases of fishing vessels, was asked for an extension of the repayment period and additional credits.

In 1965, the Netherlands constructed a large 6,000-gross-ton mothership for North Korea, which is reportedly fishing with the Soviets in the Sea of Okhotsk--possibly for king crab or herring.

A group of Norwegian businessmen and fishery specialists is planning to visit Seoul to inspect Korea's growing fishing industry. The Norwegians were reported interested in promoting joint-investment in fishmeal processing plants and fishing vessel repair and shipbuilding yards. (U. S. Embassy, Seoul, Oct. 5, 1966.)

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Republic of Korea (Contd.):

NEGOTIATES FOR SECOND FISHERY LOAN FROM ITALIAN-FRENCH CONSORTIUM

To avoid relying too heavily on Japan in the import of fishing vessels, ROK is negotiating for a second Franco-Italian loan totaling $20 million.

The first Franco-Italian fisheries loan program is valued at $45,750,000. During the current negotiations for the second loan program, ROK will try to ease terms of the first loan. For the second loan, it proposes that the repayment period should be 10 years, the period guaranteeing the efficiency of the boats concerned should be 24 months, and the spare parts valued at $150,000 should be in grants. (Korean Business Review, Sept. 1966.)

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FISHERY EXPORTS ARE RISING

During January-August 1966, South Korea exported 25 percent more fishery products (US$22.1 million) than during the same period in 1965 (US$17.6 million). The increase resulted mainly from greater landings made possible by new vessels and the modernization of the fishing industry. (U. S. Embassy, Seoul, Sept. 22, 1966.)

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VESSEL RETURNS FROM NORTH PACIFIC SURVEY

The ROK fisheries research and training vessel, "Baek Kyung Ho," was scheduled to arrive at Tokyo September 25 en route to her home port of Pusan. The vessel explored fishing grounds in the eastern Bering Sea and North Pacific. It was reported that data collected will be analyzed to determine the feasibility of conducting mothership-type operations in those waters next year. (Suisancho Nippo, September 24, 1966.)

India

SOVIET UNION AIDS FISHERIES

During a July 1966 visit to Moscow, India's Premier Indira Gandhi signed a technical aid agreement for developing her nation's high-seas fishing industry. The Soviets reportedly will deliver to India 2 types of vessels suitable for deep-sea fishing. The vessels will fish experimentally for three months to determine which better suits Indian conditions. Once the decision is made, the USSR will supply a "large number" of vessels of the desired type. A shipyard for fishing vessels also will be built in India with Soviet help.

A Soviet technical aid team, organized by the USSR Ministry of Fisheries, visited India in November 1965 to conduct background and feasibility studies. (Fishing News International, September 1966.)

Micronesia

NEW TUNA VESSEL LAUNCHED

A 75-ft. tuna vessel, the "Emeraech" (Morning Star) was launched at a boatyard at Palau early in June 1966. The launching signals the beginning of a new period of commercial fishing in Micronesia. She is the first Hawaiian-style tuna vessel built in the area.

The boat has a larger bait and catch capacity than traditional Okinawan-style boats and requires half the crew. The U. S. High Commissioner of the Trust Territories said at the launching ceremony that the new vessel would have "deep significance" for the economic future of Micronesia. (Pacific Islands Monthly, July 1966.)

Solomon Islands

NEW COMPANY TO EXPLOIT SPINY LOBSTER

A United States firm in Philadelphia, Pa., plans to form a new company to develop a spiny lobster industry in the Solomon Islands. If the venture is a success, many Solomon Islanders could find employment in the new industry. The firm's secretary believes that the spiny lobster could become the Islands' second most valuable export product, after copra.

The local variety of spiny lobster is reputed to be delicious. (Pacific Islands Monthly, July 1966.)

AFRICA

South Africa

REDUCES NEW TRANSSHIPPING LEVY

The decision to increase levy for transshipping fish in ports by foreign vessels from 28 cents a ton to US$19.60 had been announced August 7 to become effective September 1. Spanish and Japanese companies operating large fleets off South African and South-West African coast quickly left for Angolan and Mozambique coast. In the meantime, Spain protested strongly. South Africa was asked to postpone raise so that affected nations could negotiate matter. On September 16, South Africa Railway Headquarters suspending charge from that date and said "adjustments" would be made to shippers who had paid it. According to "Cape Argus," September 20, new wharfage charges on transfer of fish is 52 cents a ton if made direct from ship to ship; 52 cents, plus $1.68 for packages under two tons, when landed on quay or jetty and then loaded aboard on-going ship; and 52 cents, plus $3.44 a ton, if transferred to cold store and later to outgoing ship. These charges will remain in effect until permanent tariffs are announced; meanwhile, foreign ships are returning to Cape Town.

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FACTORYSHIP SUCCESS INSPIRES NEW VENTURE

On September 16, two leading Cape inshore fishing companies announced decisions to buy a large factoryship to process fish outside the 12-mile fishing limit. The Minister of Economic Affairs was said to have allotted already the necessary licenses. Both decisions to enter this field apparently had been influenced by the initial success of the privately owned "Willem Barendsz." That vessel had processed fish meal worth US$1.2 million on its first voyage, exceeding its owners' most optimistic hopes.

On September 19, the two groups announced they would unite to operate factoryships and form a holding company and two subsidiary operating companies for the purpose. One of the subsidiaries will be a public company with share capital of about $5.6 million and operate two factoryships. Another company with about $2.5 million, the price of about 18 fully equipped 72-foot trawlers, will operate a mutual catching fleet for the two ships. The announcement said: "The resultant economies through this rationalisation in respect of planning, administration, operation, and conservation of capital resources should be considerable."

Negotiations were completed to buy factoryships in Norway for conversion in Cape Town: one vessel--the 19,000-ton "Kosmos V"--was bought for about $2.1 million from the whaling company liquidating its Antarctic fleet.

The new owners hope that because the Kosmos V was built originally as a factoryship, it can be made operable by the beginning of 1967, and a second ship soon after. Lessons learned from converting the Willem Barendsz should considerably decrease the costs of new ventures.

Two problems remain: the slowness in removing fish meal from factoryships for further shipment, and the limited Cape Town harbor facilities. The danger of spontaneous combustion prohibits haphazard transferral of fish meal. At the same time, the longer a factoryship remains in port to empty contents the smaller the profit. The Willem Barendsz took nearly a month. The facilities at Table Bay will remain about the same for the near future--and so will overcrowding.

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PROPOSES INTERNATIONAL CONFERENCE

On September 16, the Minister of Economic Affairs said in the House of Assembly that the government was preparing to call an international conference with countries that fished off the coast. The purpose would be to formulate a policy acceptable to all parties--and also protect the local industry. Many countries had already indicated a willingness to participate. In the meantime, the minister said, a commission of inquiry would soon be appointed to investigate the local trade. He said there would be little point in attempting to extend the 12-mile fishing limit. (U. S. Embassy, Pretoria, Sept. 27, 1966.)

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South Africa (Contd.):

MIDYEAR FISHING TRENDS

Fish Meal and Fish Oil: Adverse weather during July limited the Cape catch. As a result, it compared unfavorably with the local catches in May and June. On the other hand, the Walvis Bay factories of South-West Africa again reported a heavy intake of fish; output of all products remained at maximum. The bulk of tonnage landed in both areas was converted to fish meal and fish oil. The Cape oil yield was negligible because bulk of fish were low-oil-content anchovy, the yield at Walvis Bay factories passed peak level during July and began to decline toward month's end.

The international fish meal market remained fairly unsettled during July. This was attributed to heavy production in Scandinavian countries and general uncertainty about Peruvian operations starting again on September 1. Because of heavy forward commitments, the industry did not exert any strong selling pressure on the market, and so sale prices remained about the same as before.

The fish oil price level reflected a steady decline when compared with first-half 1966. However, this did not have much effect on the industry because the entire exportable 1966 surplus had already been sold at the beginning of the season at the ruling price level.

Spiny Lobster: The closed season for spiny lobster operations applied through July. The remaining stocks were reduced through shipments to various markets according to spread-out delivery schedule. Although the U. S. market remained somewhat unpredictable during July, it was not necessary to adjust prices to maintain movement. (Barclay's Trade Review, Johannesburg, Sept. 1966.)

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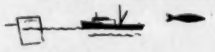
SHOAL FISH CATCH
DROPS IN FIRST-HALF 1966

The Division of Sea Fisheries reported that the Cape west coast shoal fish catch, January-June 1966, was 314,317 tons: 115,166 short tons pilchards, 21,955 tons maasbanker, 61,274 tons mackerel, 110,959 tons anchovy, and 4,963 tons red-eye herring. In first-half 1965, total catch was 381,855 tons: 222,291 short tons pilchards, 42,096 tons maasbanker, 43,967 tons mackerel, 73,501 tons anchovy, and 100 tons red-eye herring. In 1964 the catch was 351,614 tons: 257,178 tons pilchards, 19,952 tons maasbanker, 55,319 tons mackerel, 16,947 tons anchovy, and 2,218 tons red-eye herring.

The June 1966 catch totaled 79,836 tons: 6,401 tons pilchards, 8,498 tons maasbanker, 41 tons mackerel, 64,836 tons anchovy, and 60 tons of red-eye herring. In June 1965, catch was 15,571 tons pilchards, 11,521 tons maasbanker, 40,889 tons anchovy; in June 1964, 33,538 tons pilchards, 549 tons maasbanker, and 6,345 tons of anchovy in June 1964.

The June 1966 catch yielded 18,241 short tons fish meal, 327,564 gallons of fish body oil, and 126,936 lbs. of canned maasbanker.

In South-West Africa, total fish catch by the end of June had reached 510,807 tons and fish meal production was 121,981 tons. The June catch was 141,565 tons pilchards and 392 tons anchovy. (South African Shipping News and Fishing Industry Review, Aug. 1966.)



South-West Africa

PILCHARD FACTORIES REACHING QUOTAS

Three of the 7 pilchard factories at Walvis Bay completed their quotas of 90,000 tons each, and a fourth was expected to complete operations. The remaining factories were expected to reach their quotas by the end of September. The new season is expected to open early in February 1967, although one or two factories will not begin until March or April.

Output of fish and fish products at Walvis Bay and Luderitz during May and June 1966:

Product	1966	
	May	June
Canned fish (lbs.)	28,301,627	29,369,609
Fish meal (short tons)	30,178	34,161
Fish oil (long tons)	7,159	8,567

During July 1966, the following quantities of canned spiny lobster and fish and lobster meal were produced at, and exported through, Luderitz:

Product	Qty.	Value
	Lbs.	US$
Fish and lobster meal	4,833,900	205,940
Canned spiny lobster	15,000	17,220
Total	4,848,900	223,160

(Barclay's Trade Review, Johannesburg, Sept. 1966.)

PUBLICATIONS

FISH AND WILDLIFE SERVICE

These publications are available free from the Office of Information, U. S. Fish and Wildlife Service, Washington, D. C. 20240. Publications are designated:

CFS --Current fishery statistics of the United States.
FFL --Reprints of reports on foreign fisheries.
SEP.--Separates (reprints) from Commercial Fisheries Review.
SL --Statistical lists of dealers in and producer of fishery products and byproducts.
SSR. --Fish.--Special Scientific Reports--Fisheries (limited distribution)

Number Title

CFS-4154--Michigan, Ohio & Wisconsin Landings, Apr. 1966, 4 pp.
CFS-4188--Michigan, Ohio & Wisconsin Landings, May 1966, 4 pp.
CFS-4207--Shrimp Landings, Mar. 1966, 5 pp.
CFS-4208--Gulf Coast Shrimp Data, Mar. 1966, 15 pp.
CFS-4211--Rhode Island Landings, Apr. 1966, 3 pp.
CFS-4213--Fish Meal and Oil, July 1966, 2 pp.
CFS-4214--North Carolina Landings, July 1966, 3 pp.
CFS-4216--Maine Landings, June 1966, 4 pp.
CFS-4217--Louisiana Landings, June 1966, 3 pp.
CFS-4218--Louisiana Landings, July 1966, 3 pp.
CFS-4219--Massachusetts Landings, Mar. 1966, 7 pp.
CFS-4226--South Carolina Landings, June 1966, 2 pp.
CFS-4228--Georgia Landings, June 1966, 3 pp.
CFS-4230--Massachusetts Landings, Apr. 1966, 9 pp.
CFS-4231--Alabama Landings, June 1966, 3 pp.
CFS-4233--Rhode Island Landings, May 1966 3 pp.
CFS-4234--Texas Landings, June 1966, 2 pp.
CFS-4237--Fish Meal and Oil, Aug. 1966, 2 pp.
CFS-4238--Florida Landings, Aug. 1966, 8 pp.
CFS-4242--Texas Landings, July 1966, 2 pp.

SL-12--Wholesale Dealers in Fishery Products, Virginia, 1966, revised, 11 pp.

Sep. No. 773--The Channel Net for Shrimp in North Carolina.

Sep. No. 774--Rare Fossils Dredged off Atlantic Coast.

Sep. No. 775--Chile--Her Riches Are Just Off Coasts--But Far From Markets

SSR-Fish. 530--Seasonal and Areal Distribution of Zooplankton in Coastal Waters of the Gulf of Maine, 1964, by Kenneth Sherman, 11 pp., illus., May 1966.

SSR-Fish. 531--Length-Weight Relation of the Summer Flounder of Paralichthys dentatus (Linnaeus), by Fred E. Lux and L. R. Porter, Jr., 8 pp., June 1966.

The following Foreign Fishery Leaflets (formerly Market News Leaflets) are available free from the Branch of Foreign Fisheries, Bureau of Commercial Fisheries, Room 8015, U. S. Department of the Interior, Washington, D. C. 20240.

FFL-5--Denmark's Fisheries, 1964, 10 pp., Apr. 1966.
FFL-7--Mexican Fisheries, 1965, 33 pp., Oct. 1966; 1964, 27 pp. Jan. 1966.
FFL-8--Portugal's Fishing Industry, 1965, 28 pp., Aug. 1966.
FFL-10--Swedish Fisheries, 1964, 11 pp., Jan. 1966.
FFL-18--Panama's Fishing Industry, 1965, 10 pp., Mar. 1966.
FFL-22--(Supplement) Republic of South Africa and Territory of South West Africa Fisheries, 1965, 8 pp., Oct. 1966.
FFL-26--Taiwan Fisheries in 1965, 24 pp., Sept. 1966.
FFL-32--Venezuela's Fisheries, 1964, 25 pp., Apr. 1966.
FFL-34--Greek Production of Processed Fishery Products and Foreign Trade in Fish, 1965, 8 pp., June 1966.
FFL-56--Norwegian Fisheries, 1965, 8 pp., May 1966.
FFL-57--Fisheries in the Federal Republic of Germany--Annual Survey 1965, 36 pp., Aug. 1966.
FFL-58--Republic of Korea Fisheries, 1964, 4 pp., Apr. 1966.
FFL-80--Brazil's Fishing Industry, 1964 & 1965, 20 pp., June 1966.

FFL-88--Japanese Exports of Salmon and King Crab, 1962-1964, 15 pp., July 1966.
FFL-90--Belgian Fishing Industry, 1965, 21 pp., Oct. 1966.
FFL-92--Greenland's Fisheries, 1964 and 1965 Trends, 24 pp., May 1966.
FFL-101--Conference of Plenipotentiaries on the Conservation of Atlantic Tunas--Rio de Janeiro, Brazil - 2 to 14 May 1966 - Final Act, 25 pp., June 1966.
FFL-102--Fisheries Development Potential of the Territory of Baja California Sur, Mexico, 11 pp., Sept. 1966.
FFL-103--Japan's Fisheries Catch, 1965, 6 pp., Sept. 1966.
FFL-104--Fisheries of Communist China, 1966, 6 pp., Oct. 1966.

The following service publication is for sale and is available only from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

The Progressive Fish Culturist, vol. 28, no. 4, Oct. 1966, pp. 187-247, illus., printed, single copy 25 cents. Some of the articles are: "Survival of trout fed dry and meat-supplemented dry diets," by John W. Mason et al.; "Results of tests with channel catfish in Alabama ponds," by Johnie H. Crance and L. Glenn McBay; "Comparative evaluation of plastic and concrete pools and earthen ponds in fish-cultural research," by E. W. Shell; "Use of M.S. 222 in anesthetizing and transporting the sand shrimp," by Frank J. Schwartz; and "DDVP as a selective toxicant for the control of fishes and insects," by U. S. Srivastava and S. K. Konar.

The following publications are available only from the specific office mentioned:

Fishery Production in Selected Areas of Maryland, Virginia, and North Carolina, by William N. Kelly, 31 pp., Oct. 1966. (Market News Service, U. S. Fish and Wildlife Service, P. O. Box 447, Hampton, Va. 23369.) A summary of commercial landings of fish and shellfish and the production of crab meat and shucked oysters as reported by producers and wholesalers from selected principal fishing localities of Virginia, Maryland, and North Carolina. Discusses landings in the Hampton Roads, Lower Northern Neck, Lower Eastern Shore, and Chincoteague areas of Virginia; Ocean City, Cambridge, and Crisfield, Maryland; and Morehead City, North Carolina. The statistics in the summary present partial commercial fisheries production only and do not represent complete commercial landings or production for a given area, individual state, or the Chesapeake Bay area as a whole. However, the statistics do show trends in fisheries production for the specific area designated and do reflect the over-all production trends by species, localities, and states. A highlight of the report is the scallop fishery in the Chesapeake Bay region.

Research Leads to Improved Harvesting-Processing-Marketing of Commercial Farm Pond Fish, Newsletter to Industry, 15 pp., illus., printed, Aug. 16, 1966. Regional Director, Region 4, 5 Research Drive, Ann Arbor, Mich. 48103. Discusses recent accomplishments of BCF research projects of significance to farm pond fish producers.

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, September 1966, 9 pp. (Market News Service, U. S. Fish and Wildlife Service, 706 New Federal Office Bldg., 909 First Ave., Seattle, Wash. 98104.) Includes landings by the halibut fleet reported by the Seattle Halibut Exchange; salmon landings reported by primary receivers; landings of halibut reported by the International Pacific Halibut Commission; landings and otter-trawl receipts reported by the Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and nonscheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington customs district for the month indicated.

MISCELLANEOUS

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them. Correspondence regarding publications that follow should be addressed to the respective organization or publisher mentioned. Data on prices, if readily available, are shown.

ALGAE:

"New technique for mass assays of physiological characteristics of unicellular algae," by Richard L. Massey and Rudolf H. T. Mattoni, article, Applied Microbiology, vol. 13, Sept. 1965, pp. 798-800, printed.

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

Williams and Wilkins Co., 428 E. Preston St., Baltimore, Md. 21202.

AQUATIC PLANTS:
Plants of the Deep Oceans, by E. J. Ferguson Wood, Contribution No. 687, 3 pp., printed. (Reprinted from Zeitschrift fur Allegemeine Mikrobiologie, vol. 6, no. 3, 1966, pp. 177-179.) Institute of Marine Science, University of Miami, 1 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33129.

ARGENTINA:
Produccion Pesquera Argentina 1965 (Argentine Fishery Production 1965), 104 pp., illus., printed in Spanish, 1965. Departamento de Investigaciones Pesqueras, Direccion Generale de Pesca, Brasil y Florencio Sanchez, Buenos Aires, Argentina.

BACTERIOLOGY:
"Bacteria under pressure," article, Chemical and Engineering News, vol. 44, Jan. 10, 1966, p. 96, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

BARENTS SEA:
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ENJOY THE SEAFOOD SHAPES OF CHRISTMAS

Christmas is a time for sharing--for entertaining--so why not share your joys with family and friends with a taste-tempting seafood buffet?

The United States Department of the Interior's BCF home economists had your busy holiday schedule in mind when they planned this festive seafood buffet. Most of the preparation can be done early in the day, leaving you free of last minute hurrying. You'll feel like a guest at your own party!

Christmas has many shapes. For easy elegance on your holiday buffet try the seafood shapes of Christmas.

Christmas is a Seafood Star! A variety of ready-in-a-minute shrimp, pickled herring, chunks of lobster or crab meat, Maine sardines, and rolled lox adorn the five points of the styrofoam star to make a sparkling seafood sizzler for any party. Decorate the star with colorful ribbon and tape and center with a bowl of your favorite seafood sauce.

Christmas is a Seafood Ring! Festive Crab-Avocado Salad makes a taste-tempting ring with the smooth yuletide green of avocado, the zest of sour cream, a wisp of lemon, and the savory goodness of crab meat. Make it the day before--and all you have to do at party time is unmold and garnish with additional crab meat and salad greens.

Christmas is a Seafood Tree! Smoked Yule Tree is a surprise tree because its snowy boughs are made of smoked fish and cream cheese. Whip the cheese and seasonings together until smooth and fluffy; add the flaked fish and create your own Christmas tree. Trim with red pimiento stars and chopped parsley. Yule love it!

FESTIVE CRAB-AVOCADO SALAD

- 1 pound crab meat, fresh, frozen, or pasteurized
  or
- 3 cans (6½ or 7½ ounces each) crab meat
- 1 tablespoon unflavored gelatine
- ¼ cup cold water
- 2 packages (3 ounces each) lemon-flavored gelatin
- 2 cups boiling water
- ½ cup cold water
- 2 tablespoons lemon juice
- ½ teaspoon salt
- 6 drops liquid hot pepper sauce
- 1½-cups mashed avocado
- ½ cup sour cream
- ⅓ cup mayonnaise or salad dressing
- Salad greens

Thaw frozen crab meat. Drain crab meat. Remove any remaining shell or cartilage. Cut crab meat into ½ inch pieces. Sprinkle unflavored gelatine on cold water to soften. Dissolve lemon-flavored gelatin in boiling water in a 4 quart bowl. Add unflavored gelatine and stir until dissolved. Add cold water, lemon juice, salt and liquid hot pepper sauce; mix thoroughly. Chill until slightly thickened. Add avocado, sour cream, and mayonnaise. Beat with a rotary beater until smooth. Stir in the crab meat. Pour into a 1½ quart turban mold or 12 individual molds, ½ cup each. Chill overnight. Unmold on serving plate. Garnish with salad greens. Serves 12.

SMOKED FISH YULE TREE

- 1 pound smoked whitefish or other smoked fish
- 2 packages (8 ounces each) cream cheese, softened
- 2 tablespoons lemon juice
- 1⅓ tablespoons Worchestershire sauce
- 4 drops liquid hot pepper sauce
- 1 can (4 ounces) whole pimientos
- 1 styrofoam cone, 9 inches high
- 1 styrofoam square, 6 x 6 x 1 inch
- Plastic film
- ¼ cup chopped parsley
- Assorted crackers

Remove skin and bones from fish. Flake the fish. Combine cheese and seasonings and whip until smooth and fluffy. Stir in the fish. Cut pimento into small stars. Place cone in the center of the styrofoam square and draw a circle around the base of the cone. Cut out circle and round off the corners of the square. Cover cone and base with plastic film. Insert cone in the base. Spread fish mixture over cone and base to resemble Christmas tree. Sprinkle fish mixture with parsely and decorate with pimiento stars. Chill. Serve with assorted crackers. Makes approximately 3½ cups dip.

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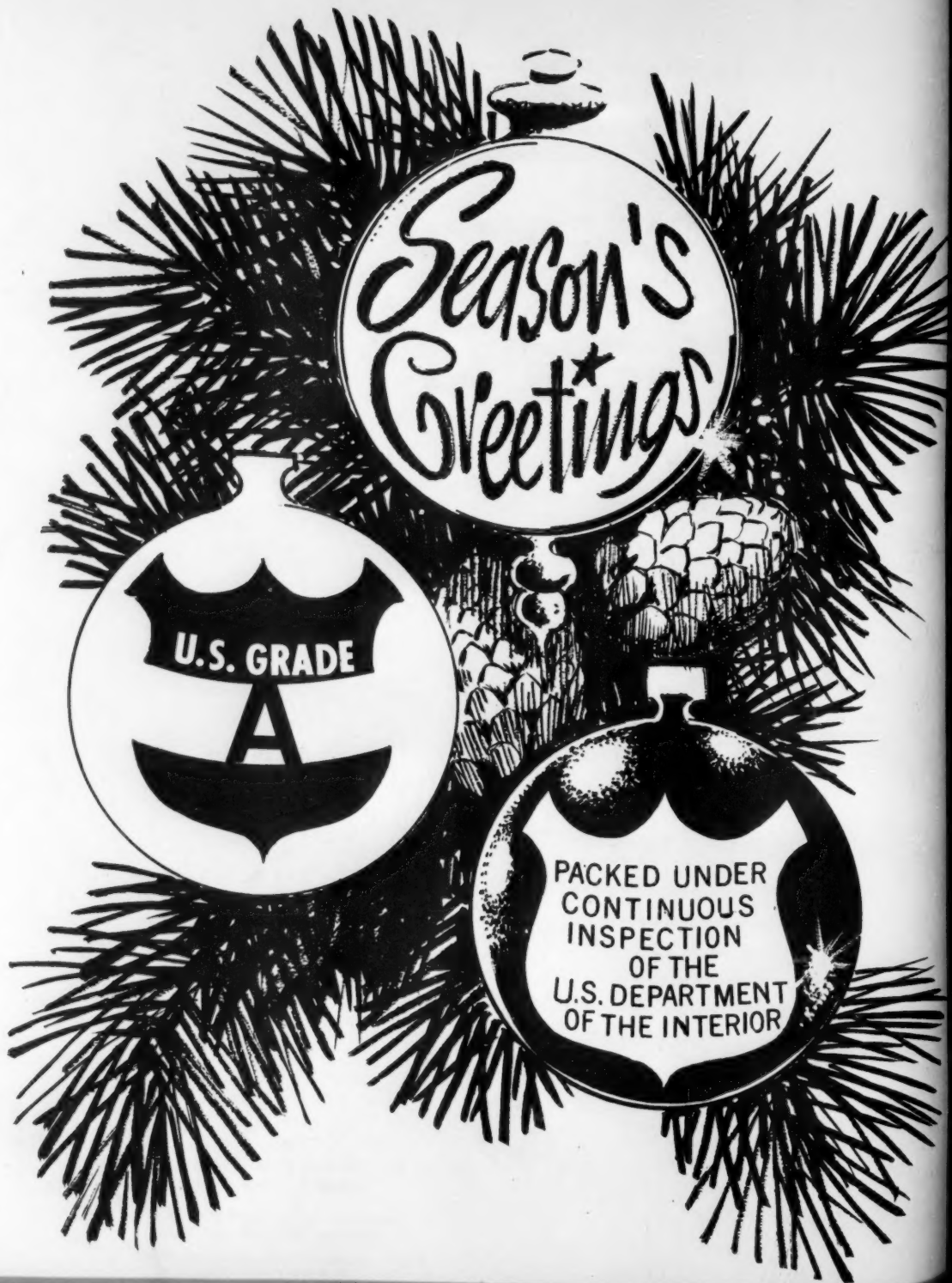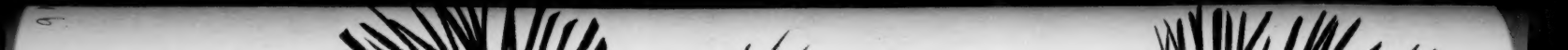
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